

## SYLLABUS [INFT]

### Image Processing

1. **Introduction to Computer Graphics:** Geometry and line generation, Graphics primitives, Transformations
2. **Digital Image Processing Systems:** Introduction, Structure of human eye, Image formation in the human eye, Brightness adaptation and discrimination, Image sensing and acquisition, Storage, Processing, Communication, Display. Image sampling and quantization, Basic relationships between pixels
3. **Image Transforms (Implementation):** Introduction to Fourier transform, DFT and 2-D DFT, Properties of 2-D DFT, FFT, IFFT, Walsh transform, Hadamard transform, Discrete cosine transform, Slant transform, Optimum transform: Karhunen - Loeve (Hotelling) transform.
4. **Image Enhancement in the Spatial Domain:** Gray level transformations, Histogram processing, Arithmetic and logic operations, Spatial filtering: Introduction, Smoothing and sharpening filters
5. **Image Enhancement in the Frequency Domain:** Frequency domain filters: Smoothing and Sharpening filters, Homomorphic filtering
6. **Wavelets and Multiresolution Processing:** Image pyramids, Subband coding, Haar transform, Series expansion, Scaling functions, Wavelet functions, Discrete wavelet transforms in one dimensions, Fast wavelet transform, Wavelet transforms in two dimensions
7. **Image Data Compression:** Fundamentals, Redundancies: Coding, Interpixel, Psycho-visual, Fidelity criteria, Image compression models, Error free compression, Lossy compression, Image compression standards: Binary image and Continuous tone still image compression standards, Video compression standards.
8. **Morphological Image Processing:** Introduction, Dilation, Erosion, Opening, Closing, Hit-or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on gray-scale images
9. **Image Segmentation:** Detection of discontinuities, Edge linking and Boundary detection, Thresholding, Region based segmentation
10. **Image Representation and Description:** Representation schemes, Boundary descriptors, Regional descriptors



### Mobile Computing

1. **Introduction:** Applications, A short history of wireless communication
2. **Wireless Transmission:** Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems.
3. **Medium Access Control:** Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.
4. **Telecommunication Systems:** GSM: Mobile services, System architecture, Radio interface, Protocols, Localization And Calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture; TETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode
5. **Satellite Systems:** History, Applications, Basics: GEO, LEO, MEO; Routing, Localization, Handover, Examples
6. **Broadcast Systems:** Overview, Cyclic repetition of data, Digital audio broadcasting: Multimedia object transfer protocol; Digital video broadcasting
7. **Wireless LAN:** Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical layer, Channel access control. Sublayer, Medium access control Sublayer, Information bases And Networking; Bluetooth: User scenarios, Physical layer, MAC layer, Networking. Security, Link management.
8. **Wireless ATM:** Motivation for WATM, Wireless ATM working group, WATM services, Reference model: Example configurations, Generic reference model; Functions: Wireless mobile terminal side, Mobility supporting network side; Radio access layer: Requirements, BRAN; Handover: Handover reference model, Handover requirements, Types of handover, Handover scenarios, Backward handover, Forward handover; Location management: Requirements for location management, Procedures and Entities; Addressing, Mobile quality of service, Access point control protocol
9. **Mobile Network Layer:** Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations,

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Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics

10. **Mobile Transport Layer:** Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP
11. **Support for Mobility:** File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Hypertext markup language, Some approaches that might help wireless access, System architectures; Wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language, WML script, Wireless telephony application, Examples Stacks with Wap, Mobile databases, Mobile agents



### **Computer Simulation and Modeling**

1. **Introduction to Simulation:** System and System environment, Components of system, Type of systems, Type of models, Steps in simulation study, Advantages and Disadvantages of simulation.
2. **Simulation Examples:** Simulation of Queueing systems, Other examples of simulation.
3. **General Principles:** Concepts of discrete event simulation, List processing,
4. **Simulation Software:** History of simulation software, Desirable software features, General-purpose simulation packages, Object oriented simulation, Trends in simulation software.
5. **Statistical Models in Simulation:** Useful statistical model, Discrete distribution, Continuous distribution, Poisson process, Empirical distribution.
6. **Queueing Models:** Characteristics of Queueing systems, Queueing notations, Long run measures of performance of Queueing systems, Steady state behavior of infinite population Markovian models, Steady state behavior finite population model, Network of Queues.
7. **Random Number Generation:** Properties of random numbers, Generation of pseudo random numbers, Techniques for generating random numbers, Tests for random numbers.
8. **Random Variate Generation:** Inverse transform technique, Convolution method, Acceptance rejection techniques
9. **Input Modeling:** Data Collection, Identifying the Distribution of data, Parameter estimation, Goodness of fit tests, Selection input model without data, Multivariate and Time series input models.
10. **Verification and Validation of Simulation Model:** Model building, Verification, and Validation, Verification of simulation models, Calibration and Validation of models.
11. **Output Analysis for a Single Model:** Types of simulations with respect to output analysis, Stochastic nature of output data, Measure of performance and their estimation, Output analysis of terminating simulators, Output analysis for steady state simulation
12. **Comparison and Evaluation of Alternative System Design:** Comparison of two system design, Comparison of several system design, Meta modeling, Optimization via simulation.
13. **Case Studies:** Simulation of manufacturing systems, Simulation of computer systems, Simulation of super market, Simulation of pert network



### **Management Information Systems**

1. **Foundation of Information System:** Introduction to Information System and MIS, Decision support and decision making systems, systems approach, the systems view of business, MIS organization within company, Management information and the systems approach.
2. **Information Technology:** A manager's overview, managerial overviews, computer hardware & software, , DBMS, RDBMS and Telecommunication.
3. **Conceptual System Design:** Define the problems, set systems objective, establish system constraints, determine information needs determine information sources, develop alternative conceptual design and select one document the system concept, prepare the conceptual design report.
4. **Detailed System Design:** Inform and involve the organization, aim of detailed design, project management of MIS detailed design , identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and

involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools, propose and organization to operate the system, document the detailed design, revisit the manager user.

5. **Implementation, Evaluation and Maintenance of the MIS:** Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files, test the system, cut-over, document the system, evaluate the MIS, control and maintain the system. Pitfalls in MIS development .
6. **Advanced Concepts in Information Systems:** Enterprise Resources Management(ERP), Supply Chain Management, C R M , Procurement Management System.
7. **Applications:** Applications of MIS in Manufacturing sector, Service sector

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*HowToExam.com*

**Image Processing – November 2004**

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **four** out of remaining **six** questions.  
 (3) **Figures** to the **right** indicate **full** marks.  
 (4) Assume suitable data if **necessary**.

1. Justify / contradict following statements : [20]  
 (a) Enhancement process does not change the information content of image.  
 (b) For digital image having salt pepper noise, median filter is the best filter.  
 (c) For continuous image histogram can be perfectly equalized, but it may not be so for digital image.  
 (d) The statement that “Run– length coding gives data compression” is not always true.  
 (e) Quality of picture depends on the number of pixels and gray level that represent the picture.

2. Let  $\phi_0(n), \phi_1(n), \phi_2(n) \dots \phi_{N-1}(n)$  be a set of N orthogonal sequences each of length N.  
 (a) Show that  $N^2$  orthogonal pattern of size  $N \times N$  can be generated by using these sequences. Prove the orthogonality of these patterns. [6]  
 (b) Write first four Walsh sequence of length  $N = 4$ , using these sequences generate sixteen orthogonal Walsh pattern. [8]  
 (c) For the following  $4 \times 4$  image show that any four patterns from the above sixteen pattern are required to fully represent the image. Identify these pattern : [6]

4	4	8	8
4	4	8	8
10	10	12	12
10	10	12	12

3. (a) What is the impulse response of each filter ? [8]  
 (i) Transfer function is :  
 $H_1(z_1, z_2) = 1 - a_1 z_1^{-1} - a_2 z_2^{-1} - a_3 z_1^{-1} z_2^{-1} - a_4 z_1, z_2^{-1}$ .  
 (ii) Frequency response is  
 $H(w_1, w_2) = 1 - 2\alpha \cos w_1 - 2\alpha \cos w_2$ .

- (b) (i) For the  $2 \times 2$  transform A and the image U : [8]

$$A = \frac{1}{\sqrt{2}} \begin{bmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{3} \end{bmatrix} \quad U = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$$

Calculate the transformed image v, and the basis image.

- (ii) Prove two– dimensional energy conservation relation. [6]

$$\sum_{x_1}^{N-1} \sum_{y=0} |f(x, y)|^2 = \sum_{u_1}^{N-1} \sum_{v=0} |F(u, v)|^2$$

where  $f(x, y)$  represent 2– D image signal and  $F(u, v)$  represents transformed domain signal.

4. (a) Give below is the table of eight symbol and their frequency occurrence. [8]

Symbol	$s_0$	$s_1$	$s_2$	$s_3$	$s_4$	$s_5$	$s_6$	$s_7$
Frequency	0.25	0.15	0.06	0.08	0.21	0.14	0.07	0.04

Give Huffman code for each eight symbols.

- (b) (i) Evaluate minimum number of average bits sequence per symbol. [4]  
 (ii) What is coding efficiency for the code you have obtain in 4(a). [4]  
 (iii) What is sum–length coding ? Explain clearly. [4]

5. (a) Explain in detail enhancement techniques in special domain used for images. [10]  
 (b) (i) Discuss thinning algorithms for finding the skeleton of a region. Apply it to a square and a triangle. [6]  
 (ii) Illustrate opening and closing operations with suitable example. [4]

6. (a) Write an expression for a two dimensional DFT. What is its relationship with one dimensional DFT ? [6]  
 (b) (i) Show that one–dimensional FFT algorithm can be used to compute two– dimensional DFT of a digital image. [7]  
 (ii) Using 4– point FFT algorithms evaluate 20 DFT of following image. [7]

0	1	2	1
1	0	1	2
2	1	0	1
1	2	1	0

7. Write short note on following :- [20]
- (a) Chain code.
  - (b) Fourier descriptor.
  - (c) Hit or miss transform.
  - (d) Uniform sampling and non uniform sampling.
  - (e) Dilation and Erosion.

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### Image Processing – May 2005

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Attempt any **five** questions.  
 (2) **Figures** to the **right** indicate **full** marks.  
 (3) Assume **suitable** data wherever **required** but justify the **same**.

1. (a) Write DDA Algorithm to draw a line, calculate all points using the same algorithm to draw line between points x(10, 10) and y(20, 15). [10]  
 (b) Show that the first order difference of a chain code normalize it to rotation. Compute the first difference of code 0101030303323232212111. [10]
2. (a) Define : [10]  
 (i) Euclidean distance  
 (ii) City block distance  
 (iii) Chess board distance  
 Consider the following subimage; determine

	1	2	3	4	5	6	7	8
1								
2								q
3								
4								
5								
6								
7								
8								
9								
10	p							

- (i) Euclidean distance
- (ii) City block distance
- (iii) Chess-board distance between p and q

- (b) Explain with suitable example region splitting and merging technique for image segmentation. [10]
3. (a) For the  $2 \times 2$  transform A and the image U [10]  

$$A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}, \quad U = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$
 Calculate the transformed image V and the basis image.  
 (b) Explain with suitable example morphological filter to eliminate background noise. [10]
4. (a) Define the following spatial filters [10]  
 (i) Median (ii) Min. (iii) Max.  
 Consider the digital image

0	1	0	6	7
2	0	1	6	5
1	1	7	5	6
1	0	6	6	5
2	5	6	7	6

- Calculate the value at point  $g(2, 2) = 7$  for above filters.  
 (b) Draw and explain block diagram of JPEG encoder and decoder. [10]
5. (a) Show that a high pass filtered image can be obtained in spatial domain as Highpass = Original – Lowpass. [10]  
 (b) Suppose that a digital image is subjected to histogram equalization. Show that a second pass of histogram equalization will produce exactly the same result as the first pass. [10]
6. (a) Draw and explain the 2-D fast wavelet transform filterbank. [10]  
 (b) Gray level histogram of an image is given below : [10]

<b>Gray level</b>	0	1	2	3	4	5	6	7
<b>Frequency</b>	0	0	26	39	16	84	20	0

Compute the gray level histogram of the output image obtained by enhancing the input by histogram equalization technique.

7. Write short notes any **four** : [20]
- (i) Image sampling
  - (ii) Walsh transform
  - (iii) Psychovisual redundancy.
  - (iv) Fourier Descriptor.
  - (v) Bit plane coding
  - (vi) Butterworth filter.

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### Image Processing – December 2005

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Question No. **1** is **compulsory**  
 (2) Attempt any **four** out of remaining **six** questions.  
 (3) **Figures** to the **right** indicate **full** marks.  
 (4) Assume suitable data if **necessary**.

1. (a) Write DDA Algorithm to draw a line. Also explain the basic transformations in compute Graphics. [10]  
 (b) Chain codes can be made invariant to translation and rotation. Explain. Compute the first difference of code 011103022232212111. [10]
2. (a) Develop an algorithm for converting one pixel thick 8 connected path to 4-connected path. [10]  
 (b) Suppose, a  $8 \times 8$  pixel image represented by 4 bits/pixel has the following grey level distribution [10]

Grey level (nx)	0	1/7	2/7	3/7	4/7	5/7	6/7	1
No. of pixel P(nx)	4	16	17	11	8	4	4	0

Modify above histogram such that the desired distribution is as follower,

Grey level (ng)	0	1/7	2/7	3/7	4/7	5/7	6/7	1
No. of pixel P(ny)	24	6	8	10	12	11	9	6

3. (a) Obtain Hadamard matrix H(8) from a simple second order matrix H(2), and draw flow diagram for H(8). [10]
- (i) Define Zequency and find it for H(8).
  - (ii) Obtain the watch matrix w(8) from H(8).
- (b) Explain the basic principle of transform coding for image compression and illustrate same with the help of DFT and DCT. [10]
4. (a) Explain dilation, erosion, opening and closing morphological operations. Also erode the following region of 1's. Using a  $3 \times 3$  square operator. [10]

1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1
1	1	1	1	0	0	1	1	1

- (b) Explain in detail enhancement techniques in spatial domain used for images. [10]
5. (a) Explain with suitable example region splitting and merging technique for image segmentation. [10]  
 (b) Write an expression for a two dimensional DCT. What is its relationship with one dimensional DCT ? Find DCT for the given image. [10]

2	0	1	0
1	1	0	1
1	0	0	1
2	1	2	3

6. (a) Explain the filter in spatial domain [10]
- (i) Low pass filter
  - (ii) High pass filter
  - (iii) Median filter
  - (iv) Butterworth filter
  - (v) Gaussian filter.
- (b) Explain in detail, what is image pyramid and sub-band coding. [10]
7. Write short notes on following [20]
- (a) Hit or Miss transform
  - (b) Polygonal approximation and signature.
  - (c) Huffman coding and Run length coding.
  - (d) Hough Transform.

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### Image Processing – May 2006

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Attempt any **five** questions out of **seven** questions.  
 (2) **Figures** to the **right** indicate **full** marks.  
 (3) Assume **suitable** data if **necessary**.

1. (a) Write DDA algorithm to draw a line, calculate all points using the same algorithm to draw line between points x(10, 10) and y(20, 20). [10]
- (b) Explain 2-D bilevel image compression standard with flowchart. [10]
2. (a) Show that subtracting the Laplacian from an image is proportional to unsharp masking. [6]
- (b) Compute a two scale fast wavelet transform of sequence  $f(n) = \{1, 2, 3, 4\}$  [9]

$$\text{Given : } h_{\phi}(n) = \begin{cases} \frac{1}{\sqrt{2}} & n = 0, 1 \\ 0 & \text{otherwise} \end{cases}$$

$$h_{\psi}(\bar{n}) = \begin{cases} \frac{1}{\sqrt{2}} & n = 0 \\ -\frac{1}{\sqrt{2}} & n = 1 \\ 0 & \text{otherwise} \end{cases}$$

- (c) Justify Hough transform used to detect the curves. [5]
3. (a) Define erosion and dialetion. What is net effect of opening and closing using gray scaled image? [10]
- (b) Apply K-L transform on  
 Given  $x_1 = (0, 0, 0)^T$ ,  $x_2 = (1, 0, 0)^T$ ,  $x_3 = (1, 1, 0)^T$  and  $x_4 = (1, 0, 1, )^T$ . [10]
4. (a) Gray level histogram of an image is given below :- [8]

<b>Gray level</b>	0	1	2	3	4	5	6	7
<b>Frequency</b>	123	78	281	417	639	1054	816	688

- Compute histogram equalization. Draw the histogram.
- (b) Obtain the slant transform matrix for  $N = 8$ . Write down the properties of slant transform. [12]
  5. (a) What is pruning? Explain the different operation required. [5]
  - (b) Compare and contrast :- [6]
    - (i) ideal HPF Vs ideal LPF.
    - (ii) Gaussian HPF Vs Gaussian LPF.
  - (c) Given a  $4 \times 4$  image whose gray levels, order lexicographically are as follows :- [9]  
 $3 \ 1 \ 2 \ 0 \ 2 \ 0 \ 3 \ 1 \ 2 \ 3 \ 1 \ 0 \ 1 \ 3 \ 0 \ 2$   
 Calculate the spatial moments upto second order.
  6. (a) Explain in details Homomorphic filter and morphological filters. [12]
  - (b) Show that Highpass = Orgional – Lowpass. [8]
  7. Write short notes on :- [20]
    - (a) Edge Linking and Boundary detection via graph theoretic Technique.
    - (b) skeleton using morphological algorithm.
    - (c) DPCM/DCT encoder for video compression
    - (d) Subband coding.

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### Image Processing – November 2006

Time : 3 Hrs.]

[Marks : 100

- N.B.** (1) Question No. **1** is compulsory.  
 (2) Attempt any **four** questions out of remaining six questions.  
 (3) Assume **suitable** data if **necessary**.

1. (a) Explain following terms: [15]
  - (i) Isopreference curve
  - (ii) Mach band
  - (iii) Simultaneous contrast
  - (iv) Uniform and Non-uniform sampling
  - (v) Fourier descriptor

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(b) Consider the two image subset  $S_1$  and  $S_2$  shown in the following **figure** for  $V = \{1\}$  determine whether these two subset are – [5]

- (1) 4-adjacent      (2) 8-adjacent      (3) M-adjacent

$S_1$					$S_2$				
0	0	0	0	0	0	0	1	1	0
1	0	0	1	0	0	1	0	0	1
1	0	0	1	0	1	1	0	0	0
0	0	1	1	1	0	0	0	0	0
0	0	1	1	1	0	0	1	1	1

2. (a) Perform Histogram Equalization for following. Obtain a plot of original as well as Equalized Histogram. [10]

<b>Intensity</b>	0	1	2	3	4	5	6	7
<b>No.of Pixel</b>	70	100	40	60	0	80	10	40

(b) Write DDA algorithm to draw a line. Also explain the basic transformation in Computer Graphics. [10]

3. (a) Assume that the edge starts in the first row and ends in the last row for the following gray image – [10]

Row			
Column	5	6	1
	5	6	1
	6	7	0
	7	1	3

Sketch all possible paths and determine the edge corresponding to minimum cost path.

(b) Apply K-L transform on. [10]

- Given  $X_1 = (0, 0, 0)^T$   
 $X_2 = (1, 0, 0)^T$   
 $X_3 = (1, 1, 0)^T$   
 $X_4 = (1, 0, 1)^T$

4. Explain in detail following image enhancement tech in spatial domain : – [20]

- (a) Image negative      (d) High pass filter  
 (b) Bit plane slicing      (e) Low pass filter  
 (c) Contrast stratching      (f) Median filter

5. (a) Find Huffman code for following six symbols. The symbols and their probabilities are given in tabular form. [10]

<b>Symbol</b>	$a_1$	$a_2$	$a_3$	$a_4$	$a_5$	$a_6$
<b>Probability</b>	0.1	0.4	0.06	0.1	0.04	0.3

Also find it average length and entropy.

(b) Consider the image – [10]

A =

0	1	0	0
0	1	0	0
0	1	1	0
1	0	0	0

Let the structuring element  $B = \begin{bmatrix} 1 & & \\ & 1 & \end{bmatrix}$  perform – (1) Erosion, (2) Dialation, (3) Opening.

6. (a) Explain Hough transform technique for detection of shape from image edges. [10]

(b) Explain Shape No. and find the Shape No. for code – [10]  
 0 1 1 1 0 3 0 2 2 2 3 2 2 1 2 1 1 1

7. Write short notes:– [20]

- (a) Wavelet transform  
 (b) Psychovisual redundancy  
 (c) Split and merge  
 (d) Polygonal approximation  
 (e) Euler No



**Image Processing – May 2007**

**Time : 3 Hrs.]**

**[Marks : 100**

- N.B.** (1) Question No. 1 is **Compulsory**.  
 (2) Attempt any **four** out of remaining **six** questions.  
 (3) **Figures** to the **right** indicate **full** marks.  
 (4) Assume **suitable** data if **necessary**.

1. Justify/contradict following statements (any **five**) : [20]  
 (a) Chain codes can be made invariant to translation and rotation.  
 (b) Median filter is the best solution to remove salt and pepper noise.  
 (c) All image compression techniques are invertible.  
 (d) If Kernel of an image transform is separable and symmetric, the transform is expressed in matrix form.  
 (e) Walsh transform is nothing but sequency ordered Hadamard matrix.  
 (f) Image resulting from poor illumination cannot be segmented easily.

2. (a) A  $64 \times 64$  image, represented by 8 bits/pixel has following gray level distribution : [10]

<b>Gray Level</b>	0	1	2	3	4	5	6	7
<b>No. of Pixel</b>	128	75	280	416	635	1058	820	684

Perform Histogram Equalization and give new distribution of gray level. Show plots of original and equalized image.

- (b) Explain basic principles of detecting following in the images. [10]  
 (i) Points (ii) Lines (iii) Edges.  
 Give  $3 \times 3$  mask for each of them and explain their operation.

3. (a) Given below is the table of 8 symbols and their frequency of occurrence : [10]

<b>Symbol</b>	$S_0$	$S_1$	$S_2$	$S_3$	$S_4$	$S_5$	$S_6$	$S_7$
<b>Frequency</b>	0.25	0.15	0.06	0.08	0.21	0.14	0.07	0.04

Give Huffman code for each eight symbols.

- (b) Write DDA algorithm to draw a line. Calculate all points using the same algorithm to draw line between points  $x(10, 10)$  and  $y(20, 15)$  [10]

4. (a) Show that 2D – DCT of an image can be computed by row and column passes with 1D – DCT algorithm. [10]

- (b) For  $2 \times 2$  transform A and the image U

$$A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}, U = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

Calculate transformed image V and the basis image. [10]

5. (a) Explain the method of segmentation of images by Region Splitting and merging. [10]  
 (b) Explain the following morphological operation in terms of dilation and erosion operations : Hit or miss, Open, close, Boundary, Skeleton. [10]

6. (a) Assuming that edge starts in the first row and ends in the last row. For following gray level image, sketch all possible paths and determine edge corresponding to minimum cost path [10]

2	2	7
2	7	5
0	1	5

- (b) For the 3 bit  $4 \times 4$  size image perform following operations : [10]

- (i) Negation  
 (ii) Thresholding with  $T = 4$   
 (iii) Intensity level slicing with background with  $r_1 = 2$  and  $r_2 = 5$   
 (iv) Bit plane slicing for MSB and LSB plane  
 (v) Clipping with  $r_1 = 2$  and  $r_2 = 5$

1	2	3	0
2	4	6	7
5	2	4	3
3	2	6	1

7. (a) Draw and explain 2D – Fast Wavelet Transform Filterbanks. [10]

- (b) Write short notes on any **Two** :- [10]  
 (i) Fourier Descriptors  
 (ii) Chain Code  
 (iii) Image Compression Standard.

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## Mobile Computing – November 2004

Time : 3 Hrs.]

[Marks : 100

**N.B. :** (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** questions out of remaining **six** questions.

1. (a) Draw the block diagram of FHSS transmitter and receiver. Differentiate between slow hopping and fast hopping. [20]  
(b) Explain different methods used to increase the capacity of an analog cellular system without increasing the number of antenna sites.
2. (a) Explain GPRS architecture reference model and show the protocol architecture of the transmission plane for GPRS. [20]  
(b) Explain the security algorithms used in GSM.
3. (a) Show the typical satellite system for global mobile telecommunication and describe the basic applications for satellite communications. [20]  
(b) Explain UMTS basic architecture and also explain frame structure for UMTS FDD mode.
4. (a) (i) What is RTS/CTS in 802.11, what services does it provide and how it is implemented? [20]  
(ii) Give the physical specification summary of the DSSS and FHSS used by the IEEE 802.11.  
(b) Explain similarities between HIPERLAN and 802.11.
5. (a) Why QoS so important in WATM network? What different types of QoS should a WATM network support? [20]  
(b) Why is routing in adhoc networks complicated, what are special challenges?
6. (a) How and why does I-TCP isolate problems on the wireless link? What are main drawbacks of this solution? [20]  
(b) Explain wireless transaction protocol.
7. Write short notes on (any **two**) [20]  
(a) Bluetooth  
(b) Wireless Telephony Application  
(c) Wireless Datagram Protocol.

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## Mobile Computing – May 2005

Time : 3 Hrs.]

[Marks : 100

**N.B. :** (1) Question No. 1 is **compulsory**. Attempt any **four** out of remaining.

(2) **Marks** to the **right** indicate **full** marks

(3) Make suitable assumptions wherever **necessary** and clearly justify **them**.

1. (a) Compare SDMA, TDMA, FDMA and CDMA. [20]  
(b) What are the limitations of GSM cell in terms of diameter and capacity (voice, data) for the traditional GSM, HSCSD, GPRS ? How can the capacity be increased ?
2. (a) In relation to GSM, Explain the following : [20]  
(i) 0.3 GMSK modulation for speech  
(ii) Number of channels and bandwidth allocated to the system.  
(iii) Bit pattern of time slot.  
(b) Explain DECT system architecture reference model and protocol architecture.
3. (a) Explain localization of user in satellite network. [20]  
(b) Compare Iridium, Globstar, ICO, Teledesic.
4. (a) Explain Digital Video broadcasting ? [20]  
(b) How does dynamic source routing handle routing ? What is motivation behind dynamic source routing compared to other routing algorithm from fined networks.
5. (a) Compare 802.11, a,b,g. [20]  
(b) Explain Power management in JEEE 802.11 infrastructure networks and ad-hoc network.
6. (a) Explain how tunneling works in general and especially for mobile IP using IP-in-IP, minimal, and generic routing encapsulation respectively. Discuss the advantages and disadvantages of these three methods. [20]  
(b) Explain three basic handover scenario for WATM.
7. Write notes on any two of the following : [20]  
(a) I – TCP, Snooping TCP, M-TCP.  
(b) Architecture and protocol supported by WAP.  
(c) WTA logical architecture.

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### Mobile Computing – December 2005

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **four** questions out of remaining **six** questions.  
 (2) Marks to the **right** indicate **full** marks.  
 (3) Make **suitable** assumptions wherever **necessary** and **clearly** justify them.

1. (a) Explain system architecture of a GSM system. [10]  
 (b) Draw the block diagram of FHSS transmitter and receiver. Differentiate between slow hopping and fast hopping. [10]
2. (a) Write short notes on. [5]  
 (i) Near and far terminals [5]  
 (ii) Hidden and exposed terminals [5]  
 (b) Explain DECT system architecture reference model and protocol architecture. [10]
3. (a) Compare Iridium, Globstar, ICO, Teledesic. [10]  
 (b) Explain Digital Video Broadcasting. [10]
4. (a) Compare IEEE 802.11 a,b,g. [10]  
 (b) Explain Power Management in IEEE 802.11 infrastructure networks and adhoc networks. [10]
5. (a) Explain WATM reference model with several access scenarios. [10]  
 (b) Explain Hiper LANZ basic structure and handover scenarios. [10]
6. (a) List the entities of mobile IP and describe IP packet delivery to and from the mobile node. [10]  
 (b) How and why does I-TCP isolate problems on the wireless link ? What are the drawbacks of this solution. [10]
7. Write short notes on any **two**. [20]  
 (a) WTA Logical Architecture.  
 (b) Wireless datagram Protocol.  
 (c) Indirect TCP, mobile TCP and snooping TCP.

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### Mobile Computing – May 2006

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **four** questions out of remaining.

1. (a) Draw the block diagram of FHSS transmitter and receiver. Differentiate between slow hopping and fast hopping. [10]  
 (b) Explain different methods used to increase the capacity of an analog Cellular system without increasing the number of antenna sites. [10]
2. (a) Show the typical satellite system for global mobile telecommunication and describe the basic applications for satellite communication. [10]  
 (b) Explain the architecture of a GSM system. [10]
3. (a) Explain WATM reference model with several access scenarios. [10]  
 (b) Why routing in adhoc network is complicated, what are special challenges? [10]
4. (a) Explain GPRS architecture reference model and show the protocol architecture of the transmission plane for GPRS. [10]  
 (b) Explain Digital Video Broadcasting. [10]
5. (a) Explain similarities between HIPERLAN and IEEE 802.11. [10]  
 (b) Explain how tunneling works in general and especially for mobile IP using IP-in-IP, minimal and generic routing, encapsulation, respectively. Discuss the advantages and disadvantages of these three methods. [10]
6. (a) How and why does I-TCP isolated problems on the wireless link? What are the main drawbacks of this solution? [10]  
 (b) What are the primary goals of the WAP Forum efforts and how are they reflected in the WAP protocol architecture. [10]
7. Write notes on **any two** : [20]  
 (a) Indirect TCP, mobile TCP and snooping TCP.  
 (b) WTA logical architecture  
 (c) Bluetooth  
 (d) UMTS basic architecture and frame structure for UMTS FDD mode.

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### Mobile Computing – November 2006

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.  
(2) Attempt any **four** questions out of remaining **six** questions.  
(3) **Figures** to the **right** indicate **full** marks.

1. (a) Explain signalling protocol architecture of a GSM system. [10]  
(b) Explain localization of user on satellite network. [10]
2. (a) Explain in detail different types of TDMA. [10]  
(b) Explain handover and security provided in GSM. [10]
3. (a) Explain power management in IEEE 802.11 infrastructure networks and ad-hoc networks. [10]  
(b) Explain digital audio broadcasting in detail along with DAB frame structure. [10]
4. (a) Explain WATM reference model with several access scenarios. [10]  
(b) Explain what is mean by Tunnelling and encapsulation. How it works in Ip-in-IP, minimal, and generic routing encapsulation? Show schematic. [10]
5. (a) Explain the need of spreading the spectrum. Explain in detail different types spreading the spectrum. [10]  
(b) List the entities of mobile IP and describe IP packet delivery to and from the mobile Node. [10]
6. (a) Explain the different components and interfaces of the WAP architecture in detail. [10]  
(b) Explain Hiper LANZ basic structure and handover scenarios. [10]
7. Write notes on any **two** : [10]  
(a) UMTS basic architecture and frame structure for UMTS FDD mode.  
(b) Bluetooth  
(c) Indirect TCP, mobile TCP and snooping TCP.

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### Mobile Computing – May 2007

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.  
(2) Attempt any **four** questions out of remaining six questions.  
(3) Assumptions made should be clearly stated.  
(4) Figures to the right indicate full marks.  
(5) Assume suitable data wherever required but justify the same.

1. (a) What is spread spectrum ? How spreading the spectrum can be achieved ? Explain. [10]  
(b) Explain WATM reference model with several access scenarios. [10]
2. (a) Explain the different methods to increase the capacity of an analog cellular system without increasing the number of antenna sites. [10]  
(b) Explain digital video broadcasting. [10]
3. (a) Compare Iridium, Globstar, ICO and Teledesic. [10]  
(b) List the entities of mobile IP and describe IP packet delivery to and from the mobile node. [10]
4. (a) Explain different security services offered by GSM. [10]  
(b) Explain wireless datagram protocol. [10]
5. (a) Explain dynamic source routing with example. [10]  
(b) What are general problems of mobile IP regarding security and support of quality of service. [10]
6. (a) Explain the similarities between HIPERLAN and 802.11. [10]  
(b) Why quality of service important in WATM network ? What different QOS should a WATM network support ? [10]
7. (a) Explain indirect TCP, mobile TCP and snooping TCP. [10]  
(b) Explain GPRS architectural reference model and show the protocol architecture of the transmission plane for GPRS. [10]

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**Computer Simulation & Modeling – November 2004****Time : 3 Hrs.]****[Marks : 100****N. B. :** (1) Question No. 1 compulsory.(2) Attempt any **four** question out of remaining six questions.

1. (a) What is system modeling ? Give an example and explain the different types of models. [10]  
(b) Define simulation. When is simulation appropriate and when it is not ? [10]
2. (a) State the various test for random numbers and explain briefly any two of them. [10]  
(b) What are the characteristics of queueing system and how would you determine the costs in queueing problems. [10]
3. (a) Name and explain some of the useful statistical models for queueing systems. [10]  
(b) The highway between Atlanta, Georgia and Athens, Georgia, has a high incidence of accidents along its 100 km. Public safety officers say that the occurrence of accident along the highway is randomly (uniformly) distributed, but the news media says otherwise. [10]  
The Georgia department of Public Safety published records for the month of September. These records indicated the point at which 30 accidents occurred, as follows :

88.3	40.7	36.3	27.3	36.3
91.7	67.3	7.0	45.2	23.3
98.8	90.1	17.2	23.7	97.4
32.4	87.8	69.8	62.6	99.7
20.6	73.1	21.6	6.0	45.3
76.6	73.2	27.3	87.6	87.2

Use the Kolmogorov – Smirnov test to determine whether the distribution is uniformly distributed given  $D_{0.05, 30} = 0.24$

4. (a) Explain time series input models with suitable examples. [10]  
(b) The following data were available for the past 10 years on demand and lead time. [10]  

Lead time	:	6.5	4.3	6.9	6.0	6.9	6.9	5.8	7.3	4.5	6.3
Demand	:	103	83	116	97	112	104	106	109	92	96

Estimate correlation and covariance.
5. (a) Explain in detail the 3–step approach of Naylor and finger in the validation process. [10]  
(b) Mention some important points which you would consider in selecting simulation software. Write a program for single server queue using any one of the simulation language you know. [10]
6. (a) Explain point estimation and interval estimation of  $\theta$  (or  $\phi$ ). [10]  
(b) Discuss the output analysis for terminating simulations and confidence interval estimation for a fixed number of replications. [10]
7. What are the objectives of simulation in a manufacturing system. Give the block diagram and explain the sequence of operations in a manufacturing system. Suggest a suitable simulation language for the same. [20]

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**Computer Simulation & Modeling – May 2005****Time : 3 Hrs.]****[Marks : 100****N. B. :** (1) Question No. 1 compulsory.(2) Attempt any **four** questions out of remaining six questions.

1. (a) Define simulation. What are the various steps in simulation study ? [10]  
(b) Define model. What are the different types of models ? Give example for each. [10]
2. (a) Explain simulation of queueing system with relevant flow diagrams. [10]  
(b) Discuss briefly the concept in discrete event simulation. Develop an event scheduling algorithms. [10]
3. (a) Write GPSS/H program for single server queue simulation. Give appropriate comments. [10]  
(b) What are the common features found in most simulation packages ? Explain any one of the simulation package mentioned below : EXTEND / ARENA / AUTOMOD. [10]
4. (a) What are the long run measures of performance of queueing systems ? Explain briefly. [10]  
(b) Mention the properties of random numbers, and give the methods of generating pseudo random numbers. [10]
5. (a) Discuss the steps involved in the development of a model of input data. [10]

**BE – INFT**

- (b) Record pertaining to the monthly number of job related injuries at an underground coal mine were being studied by federal agency. The value for the past 100 months were as follows : [10]

Injuries per month	Frequency of occurrence
0	35
1	40
2	13
3	6
4	4
5	1
6	1

Apply chi-square test to test these data to test the hypothesis that the underlying distribution is Poisson. (Use a level of significance of  $\alpha = 0.05$ .  $X^2_{0.5,2} = 5.99$ )

6. (a) How would you validate simulation models. [10]  
 (b) Discuss output analysis for steady state simulations. [10]
7. (a) Discuss the various issues in manufacturing and material handling simulations. [10]  
 (b) Mention some of the areas where simulation can be applied. [10]

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**Computer Simulation & Modeling – December 2005**

**Time : 3 Hrs.]**

**[Marks : 100**

- N. B. :** (1) Question No. 1 is compulsory.  
 (2) Attempt any four out of the remaining six questions.  
 (3) Assume any suitable data. if necessary.

1. (a) Define the following in Discrete Event simulation giving an example System, Model, System State, Event Notice, Activity, Event List, Delay and Clock. [8]  
 (b) When is simulation appropriate and mention a few areas of application of simulation ? What are the different types of models ? [12]
2. (a) How would you describe a queuing system ? Given the event scheduling algorithm along with the snapshot showing clock, system state and FEL. [10]  
 (b) A baker is trying to determine how many dozens of bagels to bake each day. The probability distribution of the number of bagel customers is as follows. [10]

No. of customers/day	8	10	12	14
Probability	0.35	0.30	0.25	0.10

Customer order 1, 2, 3 or 4 dozen bagels according to the following probability distribution

No. of Dozen Ordered/customer	1	2	3	4
Probability	0.4	0.3	0.2	0.1

Bagels sell for Rs. 54/- per dozen. They cost Rs.38/- per dozen to make. All bagels not sold at the end of the day are sold at half – price to a local grocery store. Based on 5 days of simulation, how many dozen (to the nearest 10 dozen) bagels should be baked each day ? In the above problem identify random inputs, decision variables, the mathematical model and the output.

3. (a) Explain steady state behaviour of infinite population – Markovian model represented by M/G/1 and M/M/1. [10]  
 (b) Explain Poisson process. A mainframe computer crashes in accordance with a Poisson process with a mean rate of one crash every 36 hours. Determine the probability that the next crash will occur between 24 and 48 hours after the last crash. [10]
4. (a) What are the useful statistical model for inventory system ? Give  $f(x)/p(x)$ ,  $E(X)$  and  $V(X)$  for the distributions used in the inventory system. [10]  
 (b) Site an example where lead time and demand are not independent random variables. Develop a suitable model for such a case. [10]
5. (a) State the properties of random numbers. What are the problems or errors that can occur when generating random numbers ? [10]  
 (b) Consider the following sequence of random numbers. How would you test it for independence ? [10]
- |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|
| 0.12 | 0.01 | 0.23 | 0.28 | 0.89 | 0.31 | 0.64 |
| 0.28 | 0.33 | 0.93 | 0.39 | 0.15 | 0.33 | 0.35 |
| 0.91 | 0.41 | 0.60 | 0.25 | 0.55 | 0.88 |      |
6. (a) How would you collect data to be used as input to simulation model ? [10]  
 In case there is no data, but the distribution is known, then, how would you generate samples to be used as input to simulation model ? Generate one set of samples inputs using each of the methods.  
 (b) Discuss the method by which the chosen distribution is evaluated for goodness –of–fit. [10]

- 7. Write short notes on any two : [20]
  - (a) Validation of models
  - (b) Output analysis for steady state simulation
  - (c) Selection of simulation software
  - (d) Simulation of Manufacturing and materials handling systems.

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### Computer Simulation & Modeling – May 2006

**Time : 3 Hrs.]**

**[Marks : 100**

- N. B.** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **four** out of remaining **six** questions.

- 1. (a) Define simulation. When is simulation appropriate and give the areas of application. [10]  
 (b) Explain the steps involved in simulation study. [10]
- 2. (a) Describe the simulation of Queueing system. [10]  
 (b) Define the simulated Time average number of customers in the system and in the queue. Give the equation. [10]
- 3. (a) Describe the simulation of Inventory system. [10]  
 (b) Discuss Multivariate and Time series Input Models. [10]
- 4. (a) Illustrate with examples the major concepts in discrete event simulation. [10]  
 (b) Write a program for single server queue using any one of the simulation language you know. Give comments for each statement. [10]
- 5. (a) What are the methods used to generate random numbers ? [10]  
 State the properties of random numbers.  
 (b) State the distributions which can be sampled using “Inverse transform technique”. Write the procedure for sampling. [10]
- 6. (a) Discuss the steps involved in the development of a useful model of input data. [10]  
 (b) Explain in detail the 3-step approach of Naylor and finger in the validation process. [10]
- 7. Write short notes on any two : [20]
  - (a) Simulation software
  - (b) Simulation in material handling system,
  - (c) Simulation of computer system (CPU and memory simulation).

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### Computer Simulation & Modeling – November 2006

**Time : 3 Hrs.]**

**[Marks : 100**

- N. B.** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any four out of the remaining six questions.

- 1. (a) Explain the steps involved in simulation study ? [10]  
 (b) Describe briefly Queueing, Inventory and Reliability systems. [10]
- 2. (a) Generate and implement Future Event List? [10]  
 (b) Draw the flow chart for arrival and departure event. Write a program for arrival and departure event using C++ and also using a simulation language. [10]
- 3. (a) What is a Poison process? Relate it to arrival event. Explain queueing behaviour and queueing discipline. [10]  
 (b) Find L, W, W<sub>Q</sub>, L<sub>Q</sub> in M/M/1 Queue. [10]
- 4. (a) Generate samples from ERLANG distribution and Exponential distribution. [10]  
 (b) Given the sample data for random input, how would you test for independence ? [10]
- 5. (a) How would you identify the distribution in the absence of sample data? [10]  
 (b) Describe the input model for an inventory system if the lead time and demand are related. [10]
- 6. (a) Give examples of terminating and non terminating simulation. Estimate confidence interval. [10]  
 (b) Discuss, the initialization bias in steady state simulation. [10]
- 7. Write short notes on any two : [20]
  - (a) Verification of Simulation Model
  - (b) Types of Models
  - (c) Application of Simulation.

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### Computer Simulation & Modeling – May 2007

Time : 3 Hrs.]

[Marks : 100

- N. B.** (1) Question No. 1 is compulsory.  
(2) Attempt any four out of remaining six questions.

1. (a) What is meant by modelling and simulation ? Explain different types of simulation. [10]  
(b) Define the following terms used in simulation. ‘System state, Entity, Event, Activity, Event notice, Future event list, Clock, Delay’. [10]
2. (a) What are queueing systems ? Describe the event scheduling simulation using system snapshots. [10]  
(b) Perform the simulation of the inventory system. Daily demand is represented by the random numbers 4, 1, 8, 5, 2 and the demand probability is given by : [10]

Demand	Probability
0	0.2
1	0.5
2	0.3

If the initial inventory is 4 units, determine on which day the shortage condition occurs.

3. (a) What are the features of simulation software. How is the selection of simulation software done. [10]  
(b) Write a GPSS or C++ program for a single server queue simulation. [10]
4. (a) Describe useful statistical models employing discrete and continuous distributions. [10]  
(b) Describe a Poisson process and relate it to arrival event, queue behaviour and discipline. [10]
5. (a) Why are random numbers used in simulation ? What techniques are used in generating random numbers. [10]  
(b) Test the following random numbers for independence by run test. Take  $\alpha = 0.05$  and critical value  $Z_{0.025} = 1.96$ . [10]  
{37, 59, 63, 07, 92, 48, 12, 86}
6. (a) Describe the inverse transform method for the generation of random variates satisfying the exponential distribution. [10]  
(b) What methods are used to obtain information about a process in the absence of input data. Give examples. [10]
7. Write notes on any two : [20]  
(a) Trends in simulation software  
(b) Issues in the simulation of manufacturing systems  
(c) Verification and validation of simulation models

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## Management Information Systems – November 2004

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.  
(2) Answer any **four** out of the remaining **six** questions.  
(3) Answers to the questions should be **grouped** (Q.No.1 and (b)) and written **together**.

1. (a) Define the subsystems of MIS according to the organizational functions and according to the managerial activities. [10]  
(b) How is Information Systems used for strategic planning, operational control and management control. [10]
2. (a) Explain public or private and formal versus informal information systems. [10]  
(b) explain the controls that can be applied for Transaction Processing System. [10]
3. (a) Explain Simon's model and how Rubenstein and Haberstroh modified it? [10]  
(b) What are the different methods to decide among alternative? [10]
4. (a) Explain with an example the value of information in Decision Making. [10]  
(b) What are the sources of planning data? Give the various techniques to analyze historical data. [10]
5. (a) How do you achieve information processing requirements from organizational structure? Can organizational culture and power change the decision making? [10]  
(b) When do you need to design socio–technical systems? Explain. [10]
6. (a) What are the different classes of decision support system? Give one example for each class. [10]  
(b) Give the advantages and disadvantages when users are developers in an organization. [10]
7. (a) Explain the three stage model of the planning process. [10]  
(b) Discuss the concept of Quality of Information System. [10]

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## Management Information Systems – May 2005

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.  
(2) Attempt any **four** out of the remaining **six** questions.  
(3) Figures to the **right** indicate for **each** questions.

1. (a) Describe the systems approach to planning. [10]  
(b) Explain the systems approach to organizing. [10]
2. (a) Discuss MIS application in Manufacturing Sector. Discuss any one of the following management functions:  
(i) Materials (ii) Marketing [10]  
(b) Discuss MIS applications in any one of the following service sectors. [10]  
(i) Airlines (ii) Hotels (iii) Hospitals
3. What are the different tasks performed during high level design? Discuss each task in detail. [20]
4. Discuss in detail major phases and activities of the 'detailed design process'. [20]
5. (a) Explain how the general weakness in the firm affect MIS development. What are the problems in MIS planning? [10]  
(b) What is a Decision Support System? Write a note on Decision Assisting information systems. [10]
6. Give step by step procedures for implementation, support, test and control of the specified MIS. [20]
7. Write detailed note on any two of the following : [20]  
(a) Enterprise Resource Planning (ERP) system  
(b) CRM  
(c) Supply Chain Management  
(d) Procurement Management System.

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## Management Information Systems – December 2005

Time : 3 Hrs.]

[Marks : 100

**N.B. :** (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** out of the remaining **six** questions.

(3) All questions carry **equal** marks.

1. (a) Write a note on 'Decision Support System'. Give the concept, Types and Models of DSS. [10]  
(b) Write a note on 'Information Systems'. Give Definition, components of computer based IS, capabilities of IS, roles of IS in an organization and classification of Information Systems. [10]
2. (a) Discuss in detail the different types of storage media. [10]  
(b) What are the different types of computer softwares? Discuss in detail. [10]
3. (a) Explain the telecommunications system in detail. [10]  
(b) Explain the key steps in project management of MIS detailed design. [10]
4. Write a detailed note on 'Conceptual System Design' – give all the steps involved in the conceptual design. [20]
5. What different 'Implementation Tasks' are carried out as part of MIS implementation? Discuss each in brief ? [20]
6. Write notes on any two of the following : [20]  
(a) Enterprise Resource Planning (ERP)  
(b) Supply Chain Management (SCM)  
(c) Customer Relationship Management (CRM)  
(d) Procurement Management Systems (PMS).
7. What different application in the service industry can be managed using MIS? Discuss each in brief ? [20]

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## Management Information Systems – May 2006

Time : 3 Hrs.]

[Marks : 100

**N.B. :** (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** out of the remaining **six** questions.

(3) Figures to the **right** indicate for **each** questions.

(4) Illustrate answers with **neat sketches** wherever **required**.

(3) Answers to the sub-questions of an individual question should be written **together** and one below the other.

1. (a) What is purpose of DSS in MIS? [3]  
Explain the difference types of DSS? [4]  
List the different criteria which can be used for decision making? [3]  
(b) How MIS is differ from IS? [5]  
Explain the physical and Conceptual view of MIS? [5]
2. (a) What are the benefits of I.T. to MIS? [5]  
Explain the pitfalls in MIS development in details? [5]  
(b) Introduction of Procurement management. [4]  
Importance of Procurement management. [4]  
How improves Productivity. [2]
3. What are the key tasks performed during conceptual design? [4]  
Give example of Internal and External constraints of the system? [7]  
Why it is need to find the information source? [4]  
How would document conceptual design? [5]
4. (a) How would you perform early system testing? [5]  
Explain in detail documentation of detailed system design? [5]  
(b) What is System maintenance? [4]  
Discuss the types of system maintenance? [6]
5. (a) Seven steps of Project Planning. [5]  
Six Steps of Project Control. [5]  
(b) Describe evaluation of MIS in detail? [5]  
What are various approaches for evaluation an MIS? [5]
6. (a) Describe in detail documentation of an MIS? [5]  
What are different methods of documentation? [5]  
(b) Any service industry like Airlines/Hospital/Insurance. [10]

7. Write short note on **any two** of the following :
- (a) ERP [10]
  - (b) CRM [10]
  - (c) Supply Chain Management [10]
  - (d) MIS application in Manufacturing Sector [10]

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### Management Information Systems – May 2007

Time : 3 Hrs.]

[Marks : 100

- N.B. :** (1) Question No. 1 is compulsory  
(2) Attempt any **four** out of remaining six questions  
(3) All questions carry equal marks.

1. (a) Define Information system. Describe roll of information system in Business Organizations ? [10]  
(b) What is Decision Support System (DSS) ? Explain structure of DSS.  
How does it differ from Management Information System (MIS) ? [10]
2. (a) What is Systems Approach? How Systems Approach is beneficial for MIS design ? [10]  
(b) Explain the strategic planning process. [10]
3. What are different tasks performed during Conceptual System Design ? [20]  
Discuss each task in detail. Explain documentation of Conceptual system design.
4. What are the different tasks performed during Detailed System Design? [20]  
Discuss each task in detail
5. (a) Discuss MIS application in service sector with example of any service Industry. [10]  
(b) Describe the pitfalls during planning and design phase of MIS [10]
6. (a) Define CRM. What are the basic objectives of CRM ? Explain different types of CRM ? [10]  
(b) What is ERP? What are benefits of ERP? What factors are important while selecting ERP Package. [10]
7. Write notes on any **two** of the following : [20]  
(a) Evaluation and Maintenance of MIS  
(b) Supply Chain Management (SCM)  
(c) Procurement Management System (PMS)  
(d) MIS application in Manufacturing Sector

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