(3 Hours) **[Total Marks: 80]**

N.B.: (1) Question No. **1 is compulsory**.
(2) Solve any **three questions** from the **remaining five**
(3) Figures to the right indicate full marks
(4) Assume suitable data if necessary and mention the same in answer sheet.

Q.1 Attempt any 4 questions [20]
a) Explain the persistent strategies of CSMA.
b) Compare between distance vector routing and link state routing.
c) The following is a dump of a TCP header in hexadecimal format :
05320017 00000001 00000000 500207FF 00000000
i) What is the source port number?
ii) What is the destination port number?
iii) What is the length of the header?
iv) What is the type of segment?
v) What is the window size?
d) What is data transparency? How it can be overcome using bit stuffing.
e) Explain Connection establishment in TCP using three way handshaking.

Q.2 a) Explain the OSI-RM model and functions of each layer. [10]

b) Explain in detail the Physical media used for computer communication. [10]

Q.3 a) Explain the various types of frames in HDLC. [10]
b) Explain Go-Back-N ARQ and Selective Repeat ARQ. [10]

Q.4 a) Discuss various Scheduling methods used in Medium access control. [10]
b) An organization is granted the block 211.17.180.0/24. The administrator wants to create 32 subnets. [5]
i) Find the subnet mask.
ii) Find the number of addresses in each subnet.
iii) Find the first and last address in subnet 1.
iv) Find the first and last addresses in subnet 32.

c) Explain Quality of service in terms of flow characteristics. [5]

Q.5 a) Explain the different error reporting messages in ICMP with message format. [10]
b) Explain the features of TCP. [5]
c) List and explain various Timers in TCP. [5]

Q.6 Short notes on: (Attempt any Two) [20]
a) Congestion control in TCP.
b) IPV4 Header.
c) DSL.

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(Time: 3 Hours) **[Marks: 80]**

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

(2) Solve any **three** questions from the remaining **five**

(3) **Figures** to the **right** indicate **full** marks

(4) Assume suitable data if necessary and mention the same in answer sheet.

Q.1 a) Draw and explain Program Status Word register of 8051. [5]
b) Explain 8051 Assembler directives. [5]
c) List the features of ARM7. [5]
d) Explain following ARM instructions: [5]
1) AND R1, R1, #5
2) LDR R0, [R2]
3) EOR R1, R0, #1
4) MVN R2, #05
5) ADD R2, R3, R3, LSL #2

Q.2 a) Draw & Explain Internal memory organization of 8051 microcontroller. [10]
b) Write a program to copy the value 55H into RAM memory locations 40H and 41H using : [10]
(a) direct addressing mode,
(b) register indirect addressing mode without a loop, and
(c) with a loop.

Q.3 a) Draw and explain the interrupt structure of 8051. [10]
b) Interface LCD to 8051 and write a program to display the message "LCD" on it. Draw the connection diagram of 8051 with LCD. [10]

Q.4 a) Explain Serial communication of 8051 with the help of SCON register. [10]
b) Draw & Explain data flow model of ARM7. [10]

Q.5 a) Explain Addressing modes of ARM7 Processor with example in each. [10]
b) Write assembly language program of ARM to implement following equation: [10]
R0 = 3xR1 + 17xR2
Without using multiply or multiply and accumulate instruction. Show calculation.

Q.6 a) Explain the implementation of stack in ARM using load-store instructions. [10]
b) Suppose a LED is interface with P0.0 of ARM. Write embedded C language program to blink this LED with certain delay. Software generated delay may be used. [10]

(Time: 3 Hours) **Max Marks: 80**

N:B:

1. **Question No. 1 is compulsory.**
2. **Out of remaining questions, attempt any three questions.**
3. **Assume suitable additional data if required.**
4. **Figures in brackets on the right hand side indicate full marks.**

Q. 1	(a)	Explain Frequency Agility and Diversity Technique.	**[05]**
	(b)	Compare CW Radar with Frequency Modulated Radar.	**[05]**
	(c)	Explain factors which govern pulse repetition frequency.	**[05]**
	(d)	Compare low power and High Power Radar Transmitter along with their applications.	**[05]**
Q. 2	(a)	Explain Doppler Filter banks along with its merits and demerits.	**[10]**
	(b)	Discuss in brief Radar Resolution Cell, land and Sea Clutter.	**[10]**
Q. 3	(a)	Derive the radar range equation as governed by minimum detectable signal to noise ratio. Enumerate the system losses that might occur in long range surveillance radar and indicate the typical value of the losses due to each factor.	**[10]**
	(b)	Give importance of Match filter of Radar and discuss them in detail.	**[10]**
Q. 4	(a)	Explain methods of Integration of Radar Pulses to improve its detection. Define Integration Improvement Factor. How does it affect Radar Equation?	**[10]**
	(b)	What is the maximum Radar Cross section in m^2 of an automobile license plate that is 12 inch wide and 6 inch high at a frequency of 10.525 GHz? What frequency will result in Maximum radar cross section of a metallic sphere whose diameter is 1 m?	**[10]**
Q. 5	(a)	With the help of detailed block diagram explain Conical Scanning used in Radar Systems.	**[10]**
	(b)	What do you mean by Radar Cross Section? Explain RCS of Sphere, Rod and Cone.	**[10]**
Q. 6	(a)	Draw and explain Travelling Wave Tube Amplifier used in Radar Transmitter.	**[10]**
	(b)	Draw block diagram of MTI Radar and explain each block in detail.	**[10]**

(3 Hours) **[Total Marks : 80]**

Note: Question no. 01 is compulsory, solve any thee questions from the remaining questions. Assume suitable data if required, figures to the right indicate full marks.

Q.1: (Solve any four questions.)

a) Explain Polarization of antenna. 5

b) What are the feed mechanism of Microstrip antenna, explain any one. 5

c) Explain single wire radiation mechanism. 5

d) Describe five controls of array antenna. 5

e) Derive the expression for FRIIS transmission equation. 5

Q2: a) With neat sketch, describe formation and detachment of electric field lines for short dipole. 10

b) With neat sketch explain Horn antenna, also describe how radiation pattern can be modified using physical dimensions of the same antenna. 10

Q.3:a) With respect to elements of Yag-Uda antenna, describe how radiation pattern of the same can be modified. 10

b) With input impedance expression, explain Folded dipole antenna. 10

Q.4:a) Derive expression for array factor of array antenna, also explain pattern multiplication of the same. 10

b) Obtain radiation pattern for 8- isotropic antennas of equal magnitude & spaced by $\lambda/2$ for array. 10

Q.5: a) Design circular microstrip antenna for 10 GHz frequency application using substrate εr=2.2 with thickness of 1.588 mm. 10

b) Explain the mechanism of ionospheric propagation. Define critical frequency & MUF. 10

Q.6: Write short notes on (any four questions, each carry five marks)

a) Polarization measurement of antenna.

b) Ground wave propagation.

c) Microstrip array.

d) Parabolic reflector antenna..

e) Near field and far field radiation

Time: 3 Hours Marks: 80

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

(2) Solve any **three questions** from the **remaining five**

(3) Figures to the right indicate full marks

(4) Assume suitable data if necessary and mention the same in answer sheet.

Q.1 Attempt **any 4** questions **[20]**

a) What is the function of an image sensor? How array sensor is different from line sensor?

b) If all the pixels in an image are shuffled, will there be any change in the histogram? Justify your answer?

c) Define opening and closing with mathematical expression.

d) Compute the mean value of the marked pixel in given image using 3 X 3 mask and rewrite the image.

2	4	6
10	25	14
1	3	5

e) Explain various boundary descriptors.

Q.2 a) Explain image enhancement techniques in detail. **[10]**

b) Explain edge linking and boundary detection using polygonal method. **[10]**

Q.3 a) Apply histogram equalization to the following image **[10]**

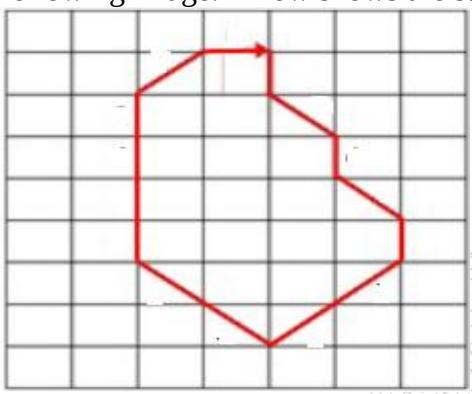
4	4	4	4	4
4	2	5	4	3
3	5	5	5	3
3	4	5	4	3
4	4	4	4	4

b) Filter the following image using 3 X 3 neighbouring averaging by zero padding. **[10]**

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

Q.4 a) What is Hit or Miss transformation? Explain in brief. **[10]**
b) Explain the principal of Homomorphic filtering. **[5]**
c) Explain advantages of Canny edge detection. **[5]**

Q.5 a) Find chain code and shape number using 8 code connectivity for the following image. Arrow shows the starting point for chain code. **[10]**



What is image segmentation? What are the basic approaches for segmenting an image? Classify segmentation. **[5]**

c) Find the number of co-occurrences of pixel i to neighbouring pixel j. **[5]**

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

Q.6 Short notes on: **(Attempt any Two)** **[20]**

a) SVM
b) B-spline algorithm
c) Noise models.

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(3 Hours) [Total Marks :80]

NB: 1) Question No.1 is compulsory
2) Solve any three from remaining five questions.

Q.1Solve all. (20 Marks)

a) Explain ACID properties of transaction.

b) Explain different types of attributes with examples?

c) Explain weak entity with example.

d) Describe trigger with example.

Q.2a) Define Normalization? Explain 1NF, 2NF and 3NF with example. (10Marks)

b)Discuss conflict serliazability and view serializability with example. (10Marks)

Q. 3a) Consider a **MOVIE database** in which data is recorded about the movieindustry. The data requirements are summarized as follows:

- Each movie is identified by title and year of release. Each movie has alength in minutes. Each has a production company, and each is classifiedunder one or more genres (such as horror, action, drama, and so forth).Each movie has one or more directors and one or more actors appear in it.Each movie also has a plot outline. Finally, each movie has zero or morequotable quotes, each of which is spoken by a particularactor appearingin the movie.
- Actors are identified by name and date of birth and appear in one or moremovies. Each actor has a role in the movie.
- Directors are also identified by name and date of birth and direct one ormore movies. It is possible for a director to act in a movie (including onethat he or she may also direct).
- Production companies are identified by name and each has an address. Aproduction company produces one or more movies.

Design an entity–relationship diagram for the movie database. (10 Marks)

b) Define deadlock. Explain Deadlock Detection, Prevention and Recovery. (10Marks)

Q.4a) Explain three level schema architecture of DBMS. State different level of dependencies in this architecture. (10 Marks)

b) What do you mean by data modelling. Discuss different types of models (10 Marks)

Q.5a) Draw E-R diagram for hospital management system. Convert E-R diagram into tables. (10 Marks)

b) Consider a Library database
member (member_no, name, age)
book(isbn, title, authors, publisher)
borrowed (member_no, isbn, date)
Write the following queries in SQL (10 Marks)

(a) Find the name of all members who have borrowed any book published by McGraw-Hill.(2 Marks)
(b) Find the name of all members who have borrowed all book published by McGraw-Hill. (4 Marks)
(c) Find the names of members who have borrowed more than five different books published by McGraw-Hill.(4 Marks)

Q.6a) Consider Bank Database (10 Marks)
Marks
Branch (branch name, branch city, assets)
customer(customer name, customer street, customer city)
loan(loan number, branch name, amount)
borrower(customer name, loan number)
account(account number, branch name, balance)
depositor(customer name, account number)
Write the following queries in SQL.

(a) Find all customers of the bank who have an account but not a loan .(2 Marks)
(b) Find the names of all branches with customers who have an account in the bank and who live in "Harrison". (2 Marks)
(c) Delete the record of all accounts with balances below the average at the bank. (2 Marks)
(d) Find out the total sum of all loan amounts in the bank.(2 Marks)
(e) Find the names of all branches where the average account balance is more than $1,200 (2 Marks)

b) Write short note on(any two) (10 Marks)
1) Constraints in SQL
2)Specialization and generalization
3) Integrity Constraints