Time: 3 Hrs **Total Marks: 80**

N.B. : (1) Question no 1 is compulsory
(2) Attempt any 3 question out of remaining.
(2) Figures to the right indicate full marks.
(3) Assume suitable data wherever necessary and indicate the same.

Q1		
a.	Compare CW Radar with Frequency Modulated Radar.	[5]
b.	Explain Frequency Agility and Diversity Technique.	[5]
c.	Explain factors which governs pulse repetition frequency.	[5]
d.	Explain radar range equation.	[5]
Q2		
a	Explain Doppler Filter banks along with its merits and demerits	[10]
b	What do you mean by Radar Cross Section? Explain RCS of Sphere.	[10]
Q3		
a	Draw and explain 'Delay Line Canceller 'along with its frequency response.	[10]
b	Give importance of Match filter of Radar and discuss them in detail.	[10]
Q4		
a	Discuss in brief Radar Resolution Cell, land and Sea Clutter	[10]
b	With the help of detailed block diagram explain Conical Scanning used in Radar Systems	[10]
Q5		
a	Draw and explain Travelling Wave Tube Amplifier used in Radar Transmitter	[10]
b	Compare low power and High Power Radar Transmitter along with their applications	[10]
Q6		
a	Explain methods of Integration of Radar Pulses to improve its detection. Define Integration Improvement Factor. How does it affect Radar Equation	[10]
b	Draw block diagram of MTI Radar and explain each block in detail.	[10]

Time: 3 Hrs **Total marks: 80**

Instructions

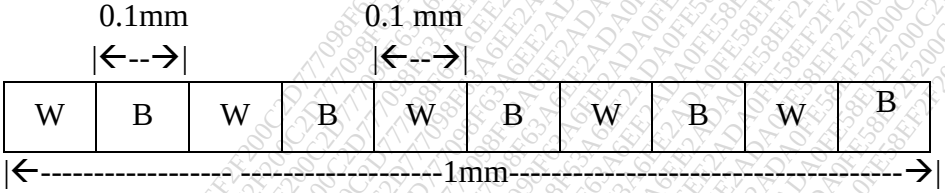
1. Q1 is compulsory
2. Solve any 3 from remaining
3. Assume suitable data if necessary

Q1 Answer the following

1. Identify the noise in following image and remove it by filtering 4M

19	0	20	21
21	150	25	26
22	23	24	27

2. For given figure, Improve and reduce the spatial resolution, consider W= White line, B = Black line, Size of each white and black line is 0.1 mm, total length is 1 mm. 4M



3. Explain the steps in digital image processing 4M
4. Write Hadamard transform matrix for N=4 and its application 4M
5. Explain the effect of illumination in thresholding 4M

Q2

1. Find Haar basis for N=4 10M
2. Explain image enhancement using frequency domain filtering 10M

Q3

1. For given image find and equalize histogram 07M

10	12	8	9
10	12	12	14
12	13	10	9
14	12	10	12

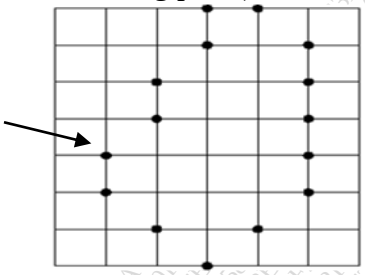
1. Apply Averaging filter on given image Use pixel replication for padding. 05M

4	8	9
12	15	18
30	32	46

2. Explain 1) Sharpening using 2nd order derivative 2) Unsharp masking and high boost filtering 8M

Q4

1. Draw PDF and write equation for following noise models 04M
   a) Gaussian Noise b) Rayleigh noise
2. Find the chain code, shape number for given image using 8-connectivity. Use anti-clockwise direction. (Arrow shows starting point) 6M



3. Find the border for image F given below using 2 different structural elements A and B respectively 10M

F=

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

A=

0	1	0
1	1	1
0	1	0

B=

1	1	1
1	1	1
1	1	1

Q5

1. Explain SVM in detail? 10M
2. Explain canny edge detection algorithm with proper steps 10M

Q6 Write Short Notes on any 2 of the following 20M

1. Geometric border representation
2. B-spline algorithm
3. Statistical texture description methods

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(Time: 3 Hours) **TotalMarks: 80**

N.B.: (1) Question No. **1** is **compulsory**.
(2) Solve any **three** from remaining **five** questions.

Q1.Answer the following questions
(a) Draw the Database Architecture and explain in brief. (5)
(b) Explain the Database recovery management in brief. (5)
(c) Describe trigger with an example. (5)
(d) What are the different types of data models? (5)

Q2. (a) Construct an ER diagram for school with the sets of students and a set of teachers associated with each student with a log of various examinations conducted write a relational schema for the ER design (10)
(b) What is deadlock? How to detect and prevent this problem? (10)

Q3. (a) Explain 1NF, 2NF, 3NF and BCNF with a suitable example? (10)
(b) Explain following types of attributes with an example.
i) Single Valued ii) Multi Valued
iii) Composite iv) Derived (10)

Q4. (a) Shop has the following relations, (10)
Inventory (code, name, number of Items)
Person (ID, name, age)
Is_ member (code ID, date of joining)
Items (accession number, Serial number, category, Size, price)
Purchased _by (accession number, serial id, date of purchase)
Answer the following queries in SQL:
i) list all the items purchased before 31st March 2019 and details of the Purchaser
ii) Find the details of Items and Customer/Purchaser who Purchased items above Rs. 15000
iii) Give the details of unsold items of size above 10 inch.
iv) List the frequent purchasers/Customers who have purchased at least one item on every visit.

(b) Explain the following terms with the help of relational algebra:
1) Set intersection 2) set difference 3) natural joint. (10)

Q5. (a) Draw the state diagram of transaction. Discuss every state in brief with an example. (10)
(b) Explain Data definition language and Data manipulation Language. (10)

Q6. Write short note on
1. Two phase locking protocol (5)
2. Constraints in SQL (5)
3. ACID Properties Integrity constraint (5)
4. Evaluation of Data Model (5)

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(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) Compare circuit switching and packet switching.
b) Illustrate byte count framing method in Data link Layer.
c) Explain the tools to achieve Error control in TCP.
d) How the medium access with Collision avoidance (MACA) protocol works in wireless LAN?
e) Describe Border Gateway protocol (BGP) as a inter-domain Routing protocol?

Q.2 a) Explain Link state Routing protocol with the help of building of Link state packets and distribution of link state packets. [10]
b) Explain HDLC frame format. Describe configuration and response modes supported by HDLC protocol. [10]

Q.3 a) Draw TCP header and explain the meaning of various fields associated with it. [10]
b) What are the different types of CSMA protocols? Explain 1-persistant CSMA protocol. [10]

Q.4 a) The following is a dump of a UDP header in hexadecimal format. [10]
CB84000D001C001C
(i) What is the source port number?
(ii) What is the destination port number?
(iii) What is the total length of the user datagram?
(iv) What is the length of the data?
(v) Is the packet directed from a client to a server or vice versa?
b) Explain Go back N protocol with suitable diagram. [10]

Q.5 a) Explain the function of Repeater, hub, bridge, routers and switches in details and mention in which layer they work. [10]
b) A company is granted the site address 181.56.0.0 (class B). The company needs 1000 subnets. Design the subnets. [05]
c) A bit stream **10011001 11100010 00100100 10000100** is transmitted to the receiver. Apply checksum error detection scheme and check whether data will be accepted at receiver or not? [05]

Q.6 Short notes on: (Attempt any four) [20]
a) IPv4 datagram
b) Point to Point Protocol (PPP)
c) Digital Subscriber Line (DSL)
d) OSI Model
e) Adaptive tree walk Protocol

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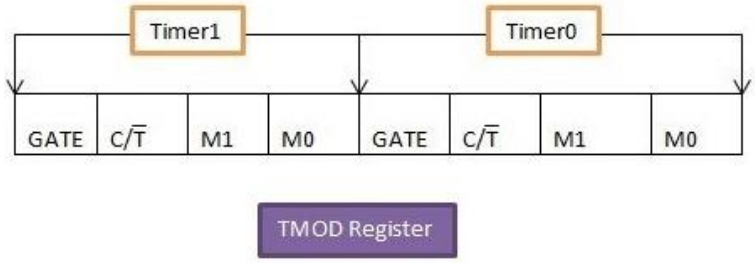
Time: 3 Hours **Marks: 80**

- Question no. 1 is compulsory
- Attempt any Three questions from remaining
- Assume suitable data wherever necessary

Q1 a) Explain Program Status word Register of 8051 Microcontroller [5]
b) Explain any five Addressing modes of 8051 with one example in each [5]
c) Write short notes on CPSR of ARM7 [5]
d) Differentiate between ARM and THUMB state. [5]

Q2 a) Explain Internal RAM Organization of 8051 Microcontroller [10]

b) Write a program for 8051 microcontroller to generate square waveform of 2kHz & 50% duty cycle at pin P2.1. Assume 8051 is operating at frequency 11.059MHz. Use hardware timer 0 in mode 1 to generate delay. [10]



Q3 a) Explain Interrupts in 8051 along with Interrupt vector table. [10]
b) Explain LCD interfacing with 8051 and write assembly language program to display message "HI" on it. Draw the connection diagram of 8051 with LCD. [10]

Q 4 a) Explain in detail 8051 Timer operating modes [10]
b) Draw & Explain dataflow model of ARM7 [10]

Q 5 a) Explain Operating modes of ARM7 Processor [10]
b) Explain Addressing modes of ARM7 Processor with examples [10]

Q 6 a) Explain following instructions of ARM7 processor with example [10]
1. ADD r0, r1, r1, LSL #1
2. STR r0, [r1]
3. LSR r0,#2
4. LDR r0,[r1,#2]
5. CMP r0,r1,LSR #3

b) Write embedded C language program to blink LED at P0.16 with certain delay. Use Software approach to generate delay. [10]

(3 Hours) (Maximum Marks 80)

NB 1. Question No. 1 is Compulsory.
2. Attempt any 3 questions out of remaining 5.
3. Assume suitable data if necessary.
4. Figures to the right indicate the maximum marks.

Q.1 a) A lossless resonant half-wavelength dipole antenna, with input impedance of 73 ohms, is connected to a transmission line whose characteristic impedance is 50 ohms. Assuming that the pattern of the antenna is given approximately by $U=B_oSin^3\theta$, find the maximum absolute gain of this antenna. 05

b) List salient features of Microstrip antenna. 05

c) Draw current distribution and radiation pattern of 0.1λ, 0.5 λ, λ and 3 λ simple dipole antenna. 05

d) What is grating lobe in broadside and end-fire array antenna, how it can be minimized in both. 05

Q2 a) What is the significance of beamwidth of antenna? If HPBW of directional antenna in E-plane and H-plane is 30^0 and 45^0 respectively, calculate directivity and gain of the same antenna. (Assume radiation efficiency =55%) 10

b) With neat sketch explain parabolic reflector antenna. List feed mechanism used. 10

Q.3 a) Derive expressions of radiation resistance of half wavelength dipole antenna. Why, actual length of half wavelength dipole antenna is lies between 0.47λ to 0.48 λ instead of 0.5 λ. 10

b) With neat diagram derive important parameters of helical antenna in axial mode. What is the effect of change in length and circumference of the same on the radiation pattern? 10

Q.4 a) What is pattern multiplication of array antenna, if two isotropic point sources of array are λ/4 distance apart and if they fed with equal amplitude and π/2 phase, draw radiation pattern of the same. 10

b) Design 10-element binomial array with a spacing of λ/2 between the elements. Determine amplitude distribution of all elements; also calculate the half-power beamwidth (in degrees) and the maximum directivity (in dB). 10

Q.5 a) Design rectangular microstrip antenna for 2.4 GHz frequency application using Rogers RT/Duroid 5880 substrate with thickness of 1.6 mm. 10

b) Describe formation of ionized layer in the ionosphere and describe their importance in radio communication. Define critical frequency. 10

Q.6 Write short notes on (any four)

a) Polarization measurements. 05

b) Ground wave propagation. 05

c) Phased (Scanning) Array. 05

d) Log-periodic antenna. 05

e) Horn antenna. 05

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

N.B.: (1) Question No. **1** is **compulsory**.
(2) Solve any **three** from remaining **five** questions.

Q1.	a)	Compare FPGA and CPLD	04
	b)	Draw carry circuit for 3-bit CLA adder using MOS	04
	c)	Draw layout for inverter using lambda rules	04
	d)	Draw D flip flop and write HDL program for it	04
	e)	Explain clock distribution scheme	04
Q2.	a)	Implement full adder circuit using CMOS	05
	b)	Design circuit for 4-bit Carry skip adder	05
	c)	Implement $Y = \overline{AB.(C + DE)}$ using following design styles 1) Static CMOS 2) Dynamic CMOS 3) Clocked MOS(C2MOS) 4)Pseudo NMOS	10
Q3.	a)	Draw 4-BIT ripple carry adder using Full adder and Write program for it using HDL	10
	b)	Design Sum of absolute differences using RTL design technique. Draw HLSM, Datapath , Interface and Controller FSM	10
Q4.	a)	Explain SRAM and its operation with proper diagram	10
	b)	Draw 4x4 bit NOR based ROM array to store the following data in respective memory locations	10

Memory Address	Data
1000	0111
0100	0101
0010	0110
0001	1001

Q5.	a)	Design RTL for Serial FIR filter. Draw HLSM, Datapath and FSM	10
	b)	Implement clocked J-K latch using CMOS and draw layout for it using Lambda design rules	10
Q6.		Write short notes	
	(a)	ESD Protection	05
	(b)	Clock Generation	05
	(c)	Interconnect delay model	05
	(d)	Flash Memory	05

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