Q1) Choose the correct option from the following questions. Each question carries equal marks. (20 marks)

1) The ratio of maximum power density in the desired direction to the average power radiated from the antenna is called as _____

A Directivity
B Directive gain
C Power gain
D Partial directivity

2) If the length of the dipole decreases then the radiation resistance will _____

A Increase
B Decrease
C Depends on current distribution
D Not change

3) If charges +Q and -Q are existing in some medium then the electric field intensity will terminate at_____

A At origin
B At +Q
C At -Q
D At infinity

4) Using Stoke's theorem we convert _____ integration into _____ integration

A Line, surface
B Line, volume
C Single, triple
D Volume, line

5) $\nabla^2 V =$ _____is the Laplace's equation

A 0
B ∞
C $\frac{-\rho_v}{\epsilon}$
D $\frac{\rho_v}{\epsilon}$

6) Using boundary conditions, one can calculate _____ component.

A Tangential and normal
B Only tangential
C Only normal
D Sequential and Tangential

7) If the distance between the transmitting and receiving antenna is decreased by factor 2 while factors remain same, then the new power received by the antenna _____

A Increases by factor 2

B Decreases by factor 2
C Increases by factor 4
D Decreases by factor 4

8) Which of the following is true for circular polarization?

A $E_x = E_y \; and \; \varphi = \frac{\pi}{2}$

B $E_x = E_y \; and \; \varphi = \frac{\pi}{4}$

C $E_x \neq E_y \; and \; \varphi = \frac{\pi}{2}$

D $E_x \neq E_y \; and \; \varphi = \frac{\pi}{4}$

9) Gauss's law for the electric field is given by_____

A $\nabla . D = 0$

B $\nabla \, x \, D = \rho_v$

C $\nabla \, x \, D = 0$

D $\nabla . D = \rho_v$

10) In yagi Uda, the length of the director compared to the driven element is _____.

A Greater
B Smaller
C Independent to each other
D Depends on the type driven element

Q2) Solve any two. (20)

2a)Define maximum usable frequency and skip distance. Derive maximum usable frequency in terms of skip distance and virtual height.

2b) Write short note on parabolic reflector antenna. Describe feeding techniques of parabolic reflector array.

2c) State and explain Coulomb's law in electrostatics. A point charge Q1 = 2mC is located in free space at P1(-3,7,-4) while Q2 = 5 nC is at P2(2,4,-1). Find force on Q2 by Q1 and vice versa.

Q3) Solve any two

(20)

3a) Derive array factor of N-element linear array, where all elements are equally fed and spaced. Also find the expression for the position of principle maxima, nulls and secondary maxima.

3b) Discuss elctric field and magnetiv field boundary conditions at the interface of two mediums with relavant mathematical equations.

3c) Describe the space wave propagation and derive relation for maximum distance between transmitting and receiving antenna. Earth is assumed to be flat.

Q4) Solve any two. (20 marks)

4a) Derive Maxwell's equation in point form and integral form.
4b) Design a rectangular microstrip patch antenna with dimensions W and L over a single substrate whose center frequency is 2.4 GHz. The dielectric constant of the substrate is 4.4 and the height of the substrate is 1.6 mm. Determine the physical dimensions W and L (in cm) of the patch, taking into account fringing field.

4c) Describe what is fading. What are the different types of fading. Explain each of them in details.

University of Mumbai

Examinations Summer 2022

Program: Electronics & Telecommunication
Curriculum Scheme: Rev 2019_C Scheme
Examination: TE Semester VI

Course Code: ECC 602 Course Name: Computer Communication Network (CCN)
Time: 2 hour 30 minutes Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of this is not a guided media?
OptionA:	Fiber optical cable
OptionB:	Coaxial cable
OptionC:	Copper wire
OptionD:	Wireless LAN
2.	Errol control and flow control are the functions of the following layer of OSI model.
Option A:	Application
Option B:	Session
Option C:	Data link layer
Option D:	Presentation
3.	_____ work at the network layer of the OSI model.
Option A:	Bridges
Option B:	Hubs
Option C:	Routers
Option D:	Gateways
4.	Which of following protocols is used by IP for generating error reports
Option A:	ICMP
Option B:	IGMP
Option C:	IGRP
Option D:	ARP
5.	_____ device is used to regenerate the signals at physical layer.
Option A:	Repeater
Option B:	Switch
Option C:	Bridge
Option D:	Router
6.	Which of the following is not an application layer protocol
Option A:	IP
Option B:	SMTP
Option C:	HTTP
Option D:	DNS
7.	Find the class of address 14.23.120.8.

Option A:	Class A
Option B:	Class C
Option C:	Class B
Option D:	Class D
8.	Telnet is used for
Option A:	Assigning IP address to a host
Option B:	Remote Login
Option C:	Assigning name to an IP address
Option D:	Video Compression
9.	Which of the following layers support process to process communication?
Option A:	Network layer
Option B:	Data link layer
Option C:	Session layer
Option D:	Transport layer
10.	Which of the following protocols provides email service?
Option A:	HTTP
Option B:	SMTP
Option C:	FTP
Option D:	TFTP

Q2	**(20Marks Each)**
A	**Solveany Two** **5markseach**
i.	Explain in detail Digital Subscriber Line (DSL).
ii.	Compare logical address and physical address.
iii.	Explain the OSI-reference model and functions of each layer.
B	**SolveanyOne** **10 marks each**
i.	Explain the different error reporting messages in ICMP with message format.
ii.	Compare IPv4 and IPv6

Q3	**(20 Marks Each)**
A	**Solveany Two** **5 marks each**
i.	The following is the dump of TCP header in hexadecimal format:05320017 00000001 00000000 500207FF 00000000 1) What is the source port number? 2) What is the destination port number? 3) What is the sequence number? 4) What is the acknowledgement number? 5) What is the length of the header?
ii.	Differentiate between Bus Topology and Ring Topology.
iii.	Explain Three-Way Handshaking for connection establishment in TCP
B	**Solve any One** **10 marks each**
i.	Explain HDLC frame format and the control frames with neat diagrams. Explain bit stuffing in HDLC.
ii.	Classify transmission media. List the applications of each. Compare Twisted pair

	cable, Coaxial cable and Fiber optical cable.

Q4	**(20 Marks Each)**	
A	**Solve any Two**	**5 marks each**
i.	Explain Selective Repeat ARQ.	
ii.	Explain the transition states of DHCP with a neat diagram.	
iii.	Compare RIP and OSPF unicast routing protocols.	
B	**Solve any One**	**10 marks each**
i.	An ISP is granted a block of addresses starting with 160.100.0.0/16. The ISP needs to distribute this address to three groups of customers as follows: Group I: The first group has 64 customers and each needs 256 addresses. Group II: The second group has 128 customers and each needs 128 addresses. Design the subblocks and find out how many addresses are still available after these allocations. Group III:128 customers each need 64 addresses Design subblocks and give slash notation for each sub block. Find how many addresses are still available after this allocation.	
ii.	What are the Hardware network devices? Explain any four in details.	

University of Mumbai

Examinations Summer FH2022

Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev2019

Examination: TE Semester VI

Course Code: ECC603 and Course Name: Image Processing Machine Vision

Time: 2 hours 30 minutes Max. Marks: 80

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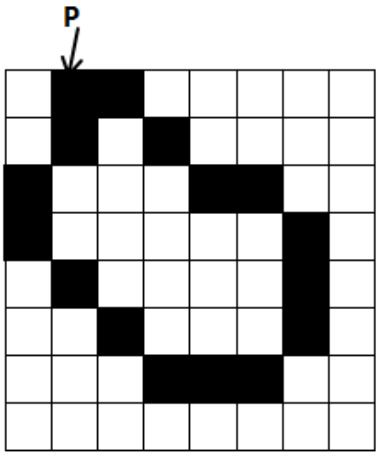
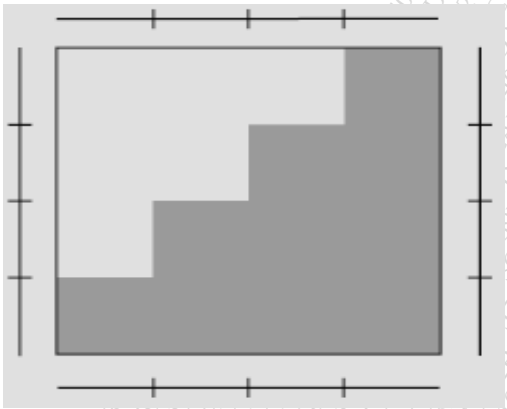
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks. State the option clearly in your answer-book.**
1.	Equalized histogram of digital image is always:
Option A:	Almost uniformly distributed over [0, L-1]
Option B:	Exactly uniformly distributed over [0, L-1]
Option C:	Concentrated in lower side of [0, L-1]
Option D:	Concentrated in higher side of [0, L-1]
2.	Spatial domain techniques used for a. Using complete dynamic range b. Binarizing a digital image, respectively, are
Option A:	a) Log transformation b) contrast stretching
Option B:	a) Contrast stretching b) thresholding function
Option C:	a) Image negative function b) Log transformation
Option D:	a) Thresholding function b) contrast stretching
3.	If the standard deviation of pixels is positive, then the sub image is labelled as
Option A:	Red
Option B:	White
Option C:	Green
Option D:	Black
4.	Increasing radius of the white circle in the Low Pass filter employed in frequency domain enhancement of digital images, results in
Option A:	More blurred image
Option B:	More sharpened image
Option C:	Clearer image with more details
Option D:	Darker image with thin details
5.	A Support Vector Machine can be best described as
Option A:	A machine learning algorithm used in pattern recognition
Option B:	A pattern recognition algorithm used in object recognition
Option C:	A neural network algorithm used for supervised learning
Option D:	A machine learning algorithm used for classification/regression
6.	The major difference between Image Enhancement and Image Restoration is that
Option A:	Enhancement is an objective process and Restoration is a subjective process
Option B:	Enhancement uses filtering techniques while Restoration uses morphological techniques.
Option C:	Restoration is an objective process and Enhancement is a subjective process
Option D:	Restoration uses filtering techniques while Enhancement uses morphological techniques.

7.	Segmentation is usually not perfect due to number of factors such as
Option A:	Noise and bad illumination
Option B:	object contains several regions
Option C:	boundary-filling
Option D:	closed contour
8.	The method used for point detection is
Option A:	Second derivative
Option B:	First Derivative
Option C:	Third Derivative
Option D:	Fourth Derivative
9.	Which of the following is process of partition the digital image into multiple regions
Option A:	Merging
Option B:	Filling
Option C:	Transform
Option D:	Splitting
10.	Signature of a circle as a shape is
Option A:	a triangular waveform
Option B:	a 45-degree line
Option C:	a square waveform
Option D:	a horizontal line

Q2.	
A	**Solve any Two** **5 marks each**
i.	Explain Unsharp Masking and High-boost Filtering.
ii.	 For the image shown above, find 8-directional chain code and shape number. Consider P as starting point and clockwise direction for the path.

iii.	Show the segmentation of the following image using split-and-merge technique. 
B	**Solve any One** **10 marks each**
i.	Explain the principle of spatial domain filtering. Perform averaging operation using 3 by 3 mask on the image given below. Use zero padded image for performing averaging operation. **4 1 7** **3 4 1** **2 3 5**
ii.	Obtain equalized histogram for the following distribution. Intensity: 0 1 2 3 4 5 6 7 Number of pixels: 70 40 100 40 10 70 10 60
Q3.	
A	**Solve any Two** **5 marks each**
i.	Justify/contradict: Shape numbers are rotation invariant representations of shape contours.
ii.	Compare Ideal, Butterworth and Gaussian filtering.
iii.	Obtain 2-D DFT of the following digital image. **3 1 2 2** **1 3 2 2** **2 1 4 3** **1 2 3 4**
	PTO

B	**Solve any One**	**10 marks each**
i.	Perform opening of the following image with the given structuring element and closing of the compliment of the same image with the same structuring element. SE: $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ Image: $f(x,y) = \begin{bmatrix} 1 & 1 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 \end{bmatrix}$	
ii.	Illustrate K-means algorithm with a suitable example.	
Q4.		
A	**Solve any Two**	**5 marks each**
i.	Justify/contradict: A deviation in the position of support vectors does not affect the classification hyperplane.	
ii.	Derive Haar transform for N=4.	
iii.	State principles of Object Recognition and explain techniques used at each step of object recognition.	
B	**Solve any One**	**10 marks each**
i.	Draw and explain model of image degradation.	
ii.	Explain Canny edge detection algorithm in detail with proper schematics.	
	END OF QUESTION PAPER	

University of Mumbai

Examination First Half 2022

Program: **Electronics & Telecommunication**

Curriculum Scheme: Rev 2019

Examination: TE Semester VI

Course Code: ECCDLO6015 and Course Name: IoT and Industry 4.0

Time: 2 hour 30 minutes Max. Marks: 80

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Q1. (20 Marks)	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Who coined the term "Internet of Things"?
Option A:	Kevin Aston
Option B:	John Wright
Option C:	Edward Jameson
Option D:	George Garton
2.	The machine to machine nodes are of how many types
Option A:	1
Option B:	2
Option C:	3
Option D:	4
3.	How many number of elements are present in open IoT architecture
Option A:	3
Option B:	7
Option C:	8
Option D:	6
4.	IoT gateway must provide
Option A:	Protocol Abstraction
Option B:	Data storage
Option C:	Security
Option D:	Fast Installation
5.	Which of the following protocols is used to link all devices in IoT
Option A:	HTTP
Option B:	UDP
Option C:	Network
Option D:	TCP/IP
6.	_____ can be described as a programming model used to develop Hadoop based applications that can process massive amounts of data
Option A:	MapReduce
Option B:	Mahout
Option C:	Oozie
Option D:	Storm
7.	The second Level of traditional automation pyramid is
Option A:	ERP

Option B:	Production Level
Option C:	Process Level
Option D:	Manufacturing Execution System
8.	Industry 5.0 is based on which technology
Option A:	Machinery
Option B:	Steam
Option C:	Internet
Option D:	Equal Global trade potential
9.	The _____ is a tool for identifying ways to create more customer value
Option A:	Value chain
Option B:	Value delivery
Option C:	Customer survey
Option D:	Products and services
10.	Which of the following is future application of IoT
Option A:	Secure communication
Option B:	Role of Green IoT system
Option C:	QoS communication
Option D:	Multimedia communication

Q2 (20 Marks)	**Solve any Four out of Six** **5 marks each**
A	What are the features of REST architectural Style.
B	With the help of neat diagram explain M2M system architecture.
C	Compare Puppet & Chef Tool
D	Explain the features of Value Creation in IoT.
E	Differentiate between IoT level 3 and level 4 application model
F	Compare IoT & IIoT in terms of functionality, connectivity & usage.

Q3 (20 Marks)	**Solve any Two Questions out of Three** **10 marks each**
A	Explain in Detail Industrial IoT architecture.
B	Design a weather monitoring IoT system using Web Sockets?
C	Write a note on Hadoop map reduce for Big data Analysis.

Q4 (20 Marks)	**Solve any Two Questions out of Three** **10 marks each**
A	Write a short Note on Industry 5.0.
B	Describe in detail about NETCONF- YANG with one example.
C	List the features of XMPP and SoAP.

University of Mumbai
Examination May 2022

Program: Electronics and Telecommunication Engineering
Curriculum Scheme: Rev2019
Examination: TE Semester VI
Course Code: ECCDLO6014 and Course Name: Database Management System
Time: 2.30 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Data independence means
Option A:	Data is defined separately and not included in programs
Option B:	Data and programs are maintained in separate files
Option C:	Is the capacity to change the schema at one level of a database system without having to change the schema at the next higher level
Option D:	Data is defined separately and included in programs
2.	Key to represent relations between tables is called……
Option A:	Super key
Option B:	Foreign key
Option C:	Primary key
Option D:	Secondary key
3.	A logical schema ……
Option A:	is the entire database
Option B:	is the standard way of organizing information into accessible parts
Option C:	Describes how data is actually stored on disk.
Option D:	Is the Entire Data base as well as the standard way of organizing information into accessible parts.
4.	E-R model uses this symbol to represent weak entity set?
Option A:	Dotted rectangle
Option B:	Diamond
Option C:	Doubly outlined rectangle
Option D:	Dotted square
5.	_____refers to the correctness and completeness of the data in a database
Option A:	Data security
Option B:	Data integrity
Option C:	Data constraint
Option D:	Data independence
6.	In SQL, which of the following is not a data manipulation Language commands?
Option A:	DELETE
Option B:	SELECT

Option C:	UPDATE
Option D:	CREATE
7.	A transaction completes its execution is said to be……
Option A:	Saved
Option B:	Loaded
Option C:	Rolled
Option D:	Committed
8.	A type of query that is placed within a WHERE or HAVING clause of another query called……..
Option A:	Super query
Option B:	Sub query
Option C:	Master query
Option D:	Multi-query
9.	What is ACID properties of Transactions?
Option A:	Atomicity, Consistency, Isolation, Database
Option B:	Atomicity, Consistency, Isolation, Durability
Option C:	Atomicity, Consistency, Inconsistent, Durability
Option D:	Automatically, Consistency, Isolation, Durability
10.	The attribute that can be divided into other attributes is called
Option A:	Simple Attribute
Option B:	Composite Attribute
Option C:	Multi-valued Attribute
Option D:	Derived Attribute

Q2	**Solve any Two** **10 marks each**
i.	What are the constraints in SQL? Explain any two with an example.
ii.	Explain lock-based concurrency control in transaction management.
iii.	Explain Need of Normalization and explain 1NF ,2NF,3NF and BCNF
Q3	**Solve any TWO** **10 marks each**
i.	Consider the following schema for College Library Student (Roll_no , Name , Branch) Book (ISBN, Title, Author, Publisher) Issue (Roll_No , ISBN , Date_of_Issue) Write Sql Queries for the following: I. List the roll number and name of all the student of the IT branch II. Find the name of students who have issued a book published by 'XYZ' publisher III. List the title of books and their authors issued by student "Alice" IV. List title of all the books issued on or before 31st DEC 2019.

ii.	Short note on: ACID Properties of transaction DBMS
iii.	Draw ER diagram and write relational schema for Hospital management system.

Q4	**Solve any Two**	**10 marks each**
i.	Draw and explain Transaction state diagram	
ii.	Explain Joins and types of Joins with suitable example	
iii.	Explain aggregate function along with one example?	

University of Mumbai

Examinations Summer 2022

Time: 2 hour 30 minutes Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	8051 series has how many 16 bit registers?
Option A:	0
Option B:	1
Option C:	2
Option D:	3
2.	In 8051, after RETI instruction is executed then the pointer will move to which location in the program?
Option A:	next interrupt of the interrupt vector table
Option B:	immediate next instruction where interrupt is occurred
Option C:	next instruction after the RETI in the memory
Option D:	none of the mentioned
3.	In 8051, the DAA command adds 6 to the nibble if:
Option A:	CY and AC are necessarily 1
Option B:	either CY or AC is 1
Option C:	no relation with CY or AC
Option D:	CY is 1
4.	Which of the following registers of 8051 are not bit addressable?
Option A:	SCON
Option B:	PCON
Option C:	A
Option D:	PSW
5.	What is the function of the TMOD register?
Option A:	TMOD register is used to set various operation modes of timer/counter
Option B:	TMOD register is used to load the count of the timer
Option C:	Is the destination or the final register where the result is obtained after the operation of the timer
Option D:	Is used to interrupt the timer
6.	What does T, D, M, I stand for in ARM7TDMI?
Option A:	Timer, Debug, Multiplex, ICE
Option B:	Thumb, Debug, Multiplier, ICE
Option C:	Timer, Debug, Modulation, IS
Option D:	Thumb, Debug, Multiplier, ICE
7.	The address space in ARM is _____?
Option A:	2^8
Option B:	2^16
Option C:	2^32
Option D:	2^64
8.	Instruction used to multiply R5 contents by R4 and to store the result into R6 is _____.
Option A:	MUL R6, R5, LSL #2
Option B:	MUL R6, R5, R4

Option C:	MUL R6, R5, LSR #2
Option D:	None of the above
9.	If the initial register contents of R0, R1 and R2 were R0= 0x00000000 R1= 0x02040608 R2= 0x10305070 Assume R0 is the result register, after one of the operations below was performed on R1 and R2, which has been modified to R0 = 0x12345678 What was the operation performed on the contents of R2 and R1?
Option A:	AND
Option B:	ORR
Option C:	BIC
Option D:	MUL
10.	**Evaluate the following statements :** I. R13 is traditionally used as the stack pointer and stores the head of the stack in the current processor mode. II. R14 is the link register where the core puts the return address on executing a subroutine. III. R15 is the program counter and contains the address of the next instruction to be fetched.
Option A:	All the options are true
Option B:	I and II are true
Option C:	II and III are true
Option D:	I and III are true

Q2.	**Solve any Four out of Six** **5 marks each**
A	Differentiate between Microprocessor & Microcontroller. .
B	List the features of ARM7.
C	List and explain all addressing modes of 8051.
D	State the validity of following instruction, if not valid why? 1) MOV R2, R3 2) PUSH A 3) MOV DPTR, #3333H 4) MOV A, @R3 5) CMP R0, R1, LSL #04
E	Explain the following ARM7 instructions: 1. RSC R0 2. MLA R0 3. ADDCC R0 4. STRB R0 5. MOV R0
F	Differentiate between RISC and CISC design.

Q3.	Solve any Two Questions out of Three 10 marks each
A	Write a program for 8051 to transfer message "**MADRAS**" serially at a baud rate of 9600 in mode 1. Assume suitable operating frequency.
B	Suppose a LED is interfaced with P0.0 of ARM. Write an embedded C language program to blink this LED with certain delay. Software generated delay may be used.
C	Write a program to generate a rectangular wave of 1KHz with 25% duty cycle, on a display device connected on P1.1. Assume suitable crystal frequency.

Q4.	Solve any Two Questions out of Three 10 marks each
A	Explain Addressing modes of ARM7 Processor with examples in each.
B	Explain Serial communication of 8051 with the help of SCON register.
C	Explain the implementation of stack in ARM using load-store instructions.

Program: BE Electronics and Telecommunication Engineering
Curriculum Scheme: Revised 2019
Examination: Third Year VI Semester
Course Code: ECC604 and Course Name: Artificial Neural Networks and Fuzzy Logic

Time: 2 Hour and 30 Min Max. Marks: 80

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Note to the students: - All the Questions are compulsory and carry equal marks.

Q1.	XOR problem is exceptionally interesting to neural network researchers because
Option A:	It can be expressed in a way that allows you to use a neural network
Option B:	It is complex binary operation that cannot be solved using neural networks
Option C:	It can be solved by a single layer perceptron
Option D:	It is the simplest linearly inseparable problem that exists.
Q2.	The network that involves backward links from output to the input and hidden layers is called as
Option A:	Self-organizing maps
Option B:	Perceptron
Option C:	Recurrent neural network
Option D:	Multi layered perceptron
Q3.	Automated vehicle is an example of .
Option A:	Supervised Learning
Option B:	Unsupervised Learning
Option C:	Kohonen Learning
Option D:	Reinforcement Learning
Q4.	In an Unsupervised learning
Option A:	Specific output values are given
Option B:	Specific output values are not given
Option C:	No specific Inputs are given
Option D:	Both inputs and outputs are given
Q5.	_____ computes the output volume by computing dot product between all filters and image patch.
Option A:	Input Layer
Option B:	Convolution Layer
Option C:	Activation Function Layer
Option D:	Pool Layer
Q6.	If an input image is a matrix of size 28 X 28 and a kernel/filter of size 7 X 7 with a stride of 1. What will be the size of the convoluted matrix?
Option A:	20 x 20
Option B:	26 x 26
Option C:	24 x 24
Option D:	22 x 22

Q7.	In a simple Multi-layer Perceptron neural network model with 10 neurons in the input layer, 4 neurons in the hidden layer and 1 neuron in the output layer. What is the size of the weight matrices between hidden output layer and input hidden layer?
Option A:	[1 X 4] , [4 X 10]
Option B:	[4 X 1] , [10 X 4]
Option C:	[10 X 4] , [4 X 1]
Option D:	[10 X 4] , [1 X 4]
Q8.	In a fuzzy set, the membership function generally in ranges
Option A:	10-100
Option B:	100-1000
Option C:	1-10
Option D:	0 – 1
Q9.	Three main basic features involved in characterizing membership function are
Option A:	Intuition, Inference and Rank ordering
Option B:	Weighted Average, Mean of maximum, Centroid
Option C:	Fuzzification, Defuzzification, Knowledge base
Option D:	Core, Support and Boundary
Q10.	In SVM, if the number of input features is 2, then the hyper plane is a _____.
Option A:	Line
Option B:	Plane
Option C:	Circle
Option D:	Square

Q2	Solve any Four out of Six (5 marks each)
A	Compare Artificial Neurons with Biological Neurons. Draw the structure of Biological Neuron.
B	What are Support Vectors in Support Vectors Machines (SVM)? How SVM differs from conventional classifiers?
C	Draw two input AND gate using MP neuron
D	What do you mean by K Means algorithm? Where is it used?
E	What are the different types of Neural Network architectures?
F	Prove Demorgans's Theorem for the given two fuzzy sets Fuzzy set A=$\left\{\frac{0.4}{10}+\frac{0.9}{20}+\frac{0.1}{30}\right\}$ and Fuzzy set B = $\left\{\frac{0.2}{10}+\frac{0.7}{20}+\frac{0.6}{30}\right\}$

Q3	Solve any Two out of Three (10 marks Each)
A	What is Mamdani Fuzzy Inference System (FIS) ? What is the use of knowledge base and rule base in FIS? Draw the block diagram of FIS.
B	Organize the given samples (1 1 0 0), (0 0 0 1), (1 0 0 0) into two clusters using Kohonen self-organizing map. Assume the learning rate as 0.1.The weight matrix is given by

	$w_{ij} = \begin{pmatrix} 0.1 & 0.6 \\ 0.2 & 0.8 \\ 0.8 & 0.2 \\ 0.1 & 0.5 \end{pmatrix}$
C	With neat flow chart, describe the training algorithm for Perceptron network.

Q4	Solve any Two out of Three (10 marks each)
A	Design a fuzzy controller to determine the wash time of a fuzzy washing machine. Assume the two fuzzy inputs are dirtiness of cloth and washing load. Consider 3 descriptors for both inputs and output. Show that wash time is high if clothes are soiled to higher degree.
B	Draw Hopfield network with four output nodes. List the steps involved in its testing algorithm. For an input vector (1 1 0 1), calculate the weight matrix.
C	Draw the architecture of simple Convolution Neural Network. Define the following terms with respect to CNN. i. Convolution ii. Max Pooling iii. ReLU Activation iv. Flattening