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

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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)

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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.

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EXTC

University of Mumbai

Examinations Summer 2022

Paper Code: 93490

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

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	

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	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

Paper Code: 93698

Examinations Summer FH2022

Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev2019

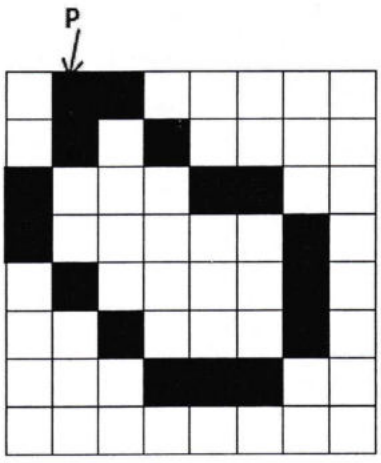
Examination: TE Semester VI

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

Time: 2 hours 30 minutes Max. Marks: 80

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.

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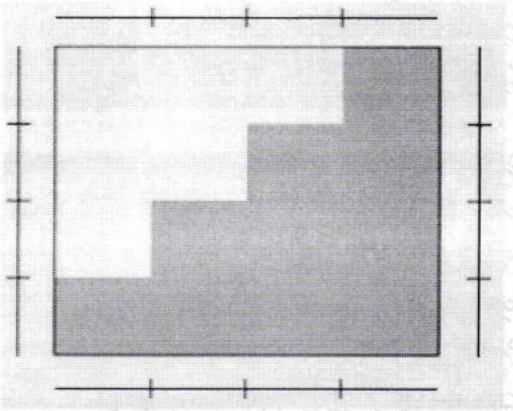
iii.	Show the segmentation of the following image using split-and-merge technique. 
B	**Solve any One** **10 marks each**
i.	Explain the principle of spatial domain filtering. Perform averaging operation using 3 by 3 mask on the image given below. Use zero padded image for performing averaging operation.

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

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Paper Code: 92659

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

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

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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

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Paper Code: 92659

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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Option C:	24 x 24
Option D:	22 x 22

	$w_{ij} = \begin{pmatrix} 0.1 & 0.6 \\ 0.2 & 0.8 \\ 0.8 & 0.2 \\ 0.1 & 0.5 \end{pmatrix}$
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

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University of Mumbai

Examination Summer 2022

Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Rev2019

Examination: **TE** Semester: **VI**

Course Code: **ECCDLO6013** and Course Name: **Digital Forensic (DF)**

Time: 2 hour 30 minutes Paper code - 94144 Max. Marks: 80

Q1.	**Choose the correct option for the following questions. All the questions are compulsory and carry equal marks**
1.	Someone who exploits a security vulnerability in order to spread public awareness that the vulnerability exists, is called?
Option A:	White Hat Hacker
Option B:	Black Hat Hackers.
Option C:	Gray Hat Hackers.
Option D:	Red Hat Hackers.
2.	CSIRT stands for
Option A:	Computer Safety Incident Response Team
Option B:	Computer Security Incident Response Team
Option C:	Computer Security Incident Responsible Team
Option D:	Computer Security Information Response Team
3.	In which phase of Incident Response Methodology, Data Collection and Data Analysis happens
Option A:	Detection of Incident
Option B:	Formulate response strategy
Option C:	Investigate the Incident
Option D:	Reporting
4.	Which statement is not true regarding Evidence Admissibility
Option A:	Evidence should not be competent.
Option B:	Evidence should be relevant.
Option C:	Evidence should be material.
Option D:	Evidence should be obtained legally.
5.	Which of the following is the disk-search utility which is used to perform a search from a physical level?
Option A:	PsLogList
Option B:	DumpeLexe
Option C:	dtSearch
Option D:	hosts
6.	Which statute protects the privacy of individuals' healthcare data?
Option A:	Privacy Act
Option B:	HIPAA
Option C:	Computer Fraud and Abuse Act
Option D:	DMCA
7.	A computer program that attaches itself to legitimate code and runs with the

	program.
Option A:	Virus
Option B:	Worm
Option C:	Trojan Horse
Option D:	Trapdoor
8.	What will be the response strategy for the DOS attack incidents?
Option A:	Investigate website
Option B:	Reconfigure router to minimize flooding
Option C:	Law enforcement contacted
Option D:	Monitor attackers' activities
9.	System processes and device driver activities are recorded in _____log
Option A:	System log
Option B:	Application log
Option C:	Security log
Option D:	sysctl
10.	Which tool is used for acquiring and analyzing forensic images?
Option A:	FTK Imager
Option B:	Scalpel
Option C:	Foremost
Option D:	Volatility

Q2(20 Marks)	**Solve any Four out of Six (5 marks each)**
A	Differentiate passive and active attacks.
B	Differentiate attacks and vulnerabilities.
C	What are the different challenges of evidence handling?
D	Explain the steps of volatile data collection for the Unix system.
E	Differentiate between Virus, Worm, Trojan horse, and trap door.
F	What is packet sniffing? How is it done? What are the threats due to packet sniffing?

Q3 (20 Marks)	**Solve any Two Questions out of Three 10 marks each**
A	Define cybercrime. Discuss various cybercrime categories in detail.
B	Discuss how network based evidence is collected and analyzed?
C	Write a short note on the Acquisition, Duplication, Analysis, and Recovery of digital evidence

Q4 (20 Marks)	
A	**Solve any Two (5 marks each)**
i.	Which are possible investigation phases carried out in data collection and analysis?
ii.	Explain Incident Response Methodology (IRM) with a neat diagram.
iii.	Explain various types of law and different levels of law in detail?
B	**Solve any One (10 marks each)**
i.	What is Intrusion Detection System (IDS)? Discuss different types of IDS and types of intrusion detection systems methods.
ii.	Discuss the necessity of forensic duplication

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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 Paper code - 93069 Max. Marks: 80

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.

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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?	