R2016	Sub. Code
	541101

M.C.A DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Computer Application

COMPUTER ARCHITECTURE AND ORGANIZATION

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 1 = 10)$

Answer **all** questions.

1. In binary notation, what is the decimal equivalent of the number 1011? (CO1, K2)

   (a) 9 (b) 10

   (c) 11 (d) 12

2. ———————— is group of four components. (CO1, K2)

   (a) Quad (b) Pair

   (c) Octet (d) All

3. ———————— circuits needs two binary inputs and two binary outputs. (CO2, K2)

   (a) Full adder (b) Half adder

   (c) Sequential (d) Counter

4. A ———————— circuits with n inputs and produce 2^n outputs. (CO2, K2)

   (a) Multiplexer (b) Decoder

   (c) Comparator (d) Demultiplexer

5. The Memory Address Register (MAR) is primarily responsible for (CO3, K3)

   (a) Storing data fetched from memory

   (b) Storing the address of the data to be fetched or written

   (c) Keeping track of the next instruction to be executed

   (d) Performing arithmetic operations

6. Which of the following is an example of a data transfer instruction? (CO3, K3)

   (a) ADD (b) MOV

   (c) SUB (d) JMP

7. Which addressing mode uses the value of a register to find the operand? (CO4, K5)

   (a) Immediate Addressing

   (b) Direct Addressing

   (c) Indirect Addressing

   (d) Register Addressing

8. In a zero-address instruction format, how are operands specified? (CO4, K5)

   (a) Directly in the instruction

   (b) By using registers

   (c) Using an immediate value

   (d) Through memory addresses

9. What is the main function of cache memory in the memory hierarchy? (CO4, K6)

   (a) To store permanent data

   (b) To speed up data access by storing frequently used data

   (c) To manage power consumption

   (d) To execute instructions

10. Which of the following is a primary advantage of using DMA? (CO4, K6)

(a) Increased CPU workload

(b) Slower data transfer rates

(c) Reduced CPU intervention during data transfers

(d) Limited peripheral support

Part B ($5 \times 5 = 25$ marks)

Answer **all** the questions not more than 500 words each

11. (a) Simplify the Boolean expression using K-MAP

$F(A, B, C, D, E) = \sum m(0, 1, 4, 5, 16, 1721, 25, 29)$. (CO1, K2)

Or

(b) State De Morgan's theorem. (CO1, K2)

12. (a) Explain the functionality of Shift Registers. (CO2, K2)

Or

(b) Explain the Logic diagram of JK flip-flop. (CO2, K2)

13. (a) Briefly explain the memory reference instruction. (CO3, K3)

Or

(b) Explain the computer registers. (CO3, K3)

14. (a) Write a short note on stack organization. (CO4, K5)

Or

(b) Briefly explain the addressing modes. (CO4, K5)

15. (a) Elaborate on memory hierarchy. (CO4, K6)

Or

(b) Write a short note on modes of data transfer. (CO4, K6)

Part C ($5 \times 8 = 40$ Marks)

Answer **all** the questions not more than 1000 words each.

16. (a) Simplify the Boolean expressions to minimum number of literals. (CO1, K2)

(i) X' +XY + XZ' + XYZ'

(ii) (X+Y) (X+Y').

Or

(b) Reduce the expression $f(x,y,z,w) = \pi M(0,2,7,8,9,10,11,15)$. d(3,4) using K-Map. (CO1, K2)

17. (a) Explain the functionality of BCD counter (CO2, K2)

Or

(b) Explain The Half adder? Implement the full adder using two half adders. (CO2, K2)

18. (a) Illustrate the phases of Interrupt Cycle with a neat flowchart. (CO3, K3)

Or

(b) Explain timing and control mechanism. (CO3, K3)

19. (a) Elaborately explain instruction format. (CO4, K5)

Or

(b) Describe general register organization. (CO4, K5)

20. (a) Briefly explain memory management hardware. (CO4, K6)

Or

(b) Describe the mechanism of Direct Memory Access. (CO4, K6)

———————

R2017	Sub. Code
	541102

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Computer Application

OBJECT ORIENTED PROGRAMMING AND C++

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 1 = 10)$

Answer **all** the questions, by choosing the correct option.

1. Which of the following is not a valid access specifier in C++ (CO1, K2)

   (a) public (b) private

   (c) protected (d) friendly

2. Which of the following is used to terminate a statement in C++ (CO1, K4)

   (a) . (b) ,

   (c) ; (d) :

3. What is the purpose of a destructor in C++? (CO2, K6)

   (a) To initialize the object

   (b) To overload operators

   (c) To free resources when an object is destroyed

   (d) To assign values to member variables

4. Which of the following is true about friend functions in C++? (CO2, K6)

(a) They can access private members of the class

(b) They are a member of the class

(c) They can only be called from within the class

(d) They are defined using the friend() keyword

5. What is inheritance in C++? (CO3,K6)

(a) A way to copy one class to another.

(b) A method for deriving a new class from an existing class.

(c) A way of overloading functions in a class.

(d) A technique for accessing private members of a class.

6. What is the purpose of the virtual keyword in C++? (CO3,K6)

(a) It prevents the function from being inherited.

(b) It allows the function to be overridden in derived classes.

(c) It makes a class abstract.

(d) It makes the function public by default

7. Which header file is required to perform file operations in C++? (CO4, K3)

(a) <iostream> (b) <fstream>

(c) <ifstream> (d) <ofstream>

8. Which class is used to write to files in C++? (CO4, K3)

(a) ifstream (b) ofstream

(c) fstream (d) istream

9. What is a template in C++? (CO5, K4)

(a) A function that is used to copy one class to another

(b) A feature of C++ that allows functions and classes to operate with generic types

(c) A class that only works with integers

(d) A function used for memory management

10. What is an exception in C++? (CO5, K4)

(a) An error that Occurs during compilation

(b) A runtime error that can be handled using special mechanisms

(c) A logical error in the program

(d) A warning issued by the compiler

Section B (5 × 5 = 25)

Answer **all** the questions, not more than 500 words each.

11. (a) Describe the structure of C++ program. (CO1, K4)

Or

(b) Explain the role of scope access operator. (CO1, K4)

12. (a) Explain the principles of function Overloading. (CO2, K6)

Or

(b) Write down the functionality of inline function. (CO2, K6)

13. (a) Differentiate between Base and Derived classes with an example. (CO3, K6)

Or

(b) With suitable example explain abstract base class. (CO3, K6)

14. (a) Explain manipulators. (CO4, K3)

Or

(b) Write a short note on types of containers. (CO4, K4)

15. (a) Explain the mechanism to handle uncaught exceptions. (CO5, K4)

Or

(b) Explain Catching Exceptions with example. (CO5, K4)

Section C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) With suitable example explain console I/O operations in detail. (CO1, K4)

Or

(b) Describe the object oriented programming features of C++. (CO1, K4)

17. (a) Discuss different types of constructors. (CO2, K6)

Or

(b) Write a C++ program to calculate simple interest and compound interest using classes. (CO2, K6)

18. (a) What does inheritance means in c++? What are different forms of inheritance? Give an example of each. (CO3, K6)

Or

(b) What is Polymorphism? Explain details about Types of Polymorphism with an example. (CO3, K6)

19. (a) Write a C++ program involving reading and writing of class objects in a file. (CO4, K3)

Or

(b) List and explain in brief various functions required for random access file operations. (CO4, K4)

20. (a) What is exception handling ? Explain types of exception handling and explain suitable example. (CO5, K4)

Or

(b) Write a program in C++ to cheek whether the given no is prime or not (CO5, K5)

———————

R2018	Sub. Code
	541103

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Computer Applications

RELATIONAL DATABASE MANAGEMENT SYSTEM

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 1 = 10)$

Answer **all** questions by choosing the correct option.

1. In an ER diagram, a diamond shape is used to represent. (CO1, K2)

   (a) Entities (b) Attributes

   (c) Relationships (d) Weak entities

2. Which DML command is used to change existing data in a database? (CO1, K2)

   (a) MODIFY (b) UPDATE

   (c) CHANGE (d) ALTER

3. In relational algebra, which operator is used to combine two relations? (CO2, K3)

   (a) Union

   (b) Intersection

   (c) Difference

   (d) Join

4. Which of the following symbols is commonly used in Domain Relational Calculus to represent a variable? (CO2, K3)

(a) ∀ (b) ∃

(c) t (d) x

5. What is a transitive dependency? (CO3, K5)

(a) A dependency where one attribute determines another attribute

(b) A dependency where a non-key attribute depends on another non-key attribute

(c) A dependency that involves composite keys

(d) A dependency that is necessary for data integrity

6. Which aggregate function would you use to calculate the total salary of all employees in a table? (CO3, K5)

(a) COUNT (b) SUM

(c) AVG (d) MAX

7. What does the durability property guarantee? (CO4, K3)

(a) Transactions can be rolled back in case of errors

(b) The effects of a committed transaction are permanent. even in the event of a failure

(c) All transactions will be completed in a specific order

(d) Transactions will not interfere with each other

8. What is concurrency control in a database system? (CO4, K3)

(a) A method to backup data

(b) A mechanism to ensure that database transactions arc executed in a safe and predictable manner

(c) A technique to speed up query processing

(d) A method to encrypt sensitive data

9. In which file organization method are records stored in the order they are received? (CO4, K6)

(a) Random

(b) Indexed

(c) Sequential

(d) Hashed

10. In a B+ tree, where are all the values (data records) stored? (CO4, K6)

(a) In the internal nodes

(b) In the leaf nodes only

(c) In both internal and leaf nodes

(d) In a separate structure outside the tree

Section B ($5 \times 5 = 25$)

Answer **all** questions not more than 500 words each.

11. (a) What is an Entity? Explain different type of Entities. (CO1, K2)

Or

(b) What are the basic constructs of ER model? (CO1, K2)

12. (a) List and Explain set operators of relational algebra. (CO2, K3)

Or

(b) What are aggregate functions? Explain. (CO2, K3)

13. (a) Explain the classification of functional dependency. (CO3, K5)

Or

(b) What are anomalies in database design? How can we solve it? (CO3, K5)

14. (a) Explain about ACID properties with suitable example. (CO4, K3)

Or

(b) What is concurrency control? How is it implemented in DBMS? (CO4, K3)

15. (a) Point out the ordered indices with example. (CO4, K6)

Or

(b) State the properties of B+Tree. (CO4, K6)

Section C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) Explain the following with examples:

(i) DDL

(ii) DML

(iii) View of Data. (CO1, K2)

Or

(b) Explain the basic architecture of a database management systems. (CO1, K2)

17. (a) Consider following schema and represent given statements in relation algebra form (CO2, K3)

Branch(branch_name,branch_city)

Account(branch_name, acc_ no, balance)

Depositor(Customer_name acc_ no)

(i) Find out list of customer who have account at 'abc' branch.

(ii) Find out all customer who have account in 'Ahmedabad' city and balance is greater than 10,000.

(iii) Find out list of all branch name with their maximum balance.

Or

(b) With suitable example explain following relational algebra operations: (CO2, K3)

(i) Natural join operation

(ii) Selection and projection operation.

18. (a) Illustrate with an example what is meant by partial functional dependency and describe how this type of dependency relates to 2NF. (CO3, K5)

Or

(b) Why should normalization be performed on a table and what are its benefits Explain 3NF and BCNF. (CO3, K5)

19. (a) Describe briefly about Serializability and its types with relevant example. (CO4, K3)

Or

(b) Explain about the two-phase locking with suitable example. (CO4, K3)

20. (a) Create B tree and B+ tree to insert the following key values (the order of the tree is three) 32,11, 15, 13,7,22, 15,44,67,4. (CO4, K6)

Or

(b) Describe ISAM in detail. (CO4, K6)

———————

R2019	Sub. Code
	541104

M.C.A DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Computer Application

DISCRETE MATHEMATICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 1 = 10)$

Answer **all** questions, by choosing the correct option

1. Which is used to construct the complex sentences? (CO1, K1)

   (a) Symbols

   (b) Connectives

   (c) Logical connectives

   (d) None of the above

2. Which form is called a conjunction of disjunction of literals? (CO1, K1)

   (a) Conjunctive normal form

   (b) Disjunctive normal form

   (c) Normal form

   (d) All of the mentioned

3. If a set S, has n elements, its power set has ———— elements (CO2, K1)

(a) $2n$ (b) $2^n - 1$

(c) $2^n + 1$ (d) 2^n

4. A relation R on a set A is called a partial ordering or partial order relation if R is (CO2, K3)

(a) reflexive, symmetry, transitive

(b) reflexive, antisymmetric, transitive

(c) irreflexive, symmetry, transitive

(d) reflexive, symmetry, intransitive

5. The set of idempotent elements of a commutative monoid $\{M, *, e\}$ (e-identity element) forms ———— of M. (CO3, K4)

(a) semigroup (b) subgroup

(c) moniod (d) submonoid

6. Every group of ———— is Cyclic. (CO3, K4)

(a) prime order (b) composite order

(c) even order (d) odd order

7. The number of spanning trees of a complete graph K_n is (CO4, K1)

(a) n^n (b) n^{n-1}

(c) n^{n-2} (d) n^{n-3}

8. The adjacency matrix of a graph G is (CO4, K2)

(a) rectangular matrix

(b) row matrix

(c) column matrix

(d) square matrix

9. A table with all possible values of a random variable and its corresponding Probabilities are called ———— (CO5, K5)

(a) probability distribution

(b) probability mass function

(c) probability density function

(d) cumulative distribution function

10. Variance of a random variable X is (CO5, K5)

(a) $E(X^2)$ (b) $E(X^2)-(E(X))^2$

(c) $E(X)$ (d) $(E(X))^2 - E(X^2)$

Section B $(5 \times 5 = 25)$

Answer **all** the questions not more than 500 words each.

11. (a) Without constructing the truth tables, prove that $\sim p \to (q \to r) \equiv q \to (p \vee r)$. (CO1, K1)

Or

(b) Find the disjunctive normal form of $p \wedge \sim (q \wedge r) \vee (p \to q)$ (CO1, K1)

12. (a) Which of the following relations on {0,1,2,3} are equivalence relations? Justify your answer. (CO2, K3)

(i) $R_1 = \{(0,0), (1,1), (2,2), (3,3)\}$;

(ii) $R_2 = \{(0,0), (0,2), (2,0), (2,2), (2,3), (3,2), (3,3)\}$;

(iii) $R_3 = \{(0,0), (1,1), (1,2), (2,1), (2,2), (3,3)\}$.

Or

(b) Prove that the relation $\subseteq$ of set inclusion is a partial ordering on any collection of sets. (CO2, K3)

13. (a) Prove that the set of idempotent elements of a commutative monoide $\{M, *, e\}$ forms a sub-monoid of M. (CO3, K4)

Or

(b) Prove that the kernel of a homomorphism f form a group $(G,*)$ to another group (G', Δ) is a subgroup of $(G,*)$. (CO3, K4)

14. (a) Find the adjacency matrix of a complete graph K_3. Hence find its determinant. (CO4, K2)

Or

(b) Find the vertex and edge connectivity of the following graphs: (CO4, K2)

(i) a tree T of order n;

(ii) a cycle C_n of order n;

(iii) a complete graph K_n order n;

(iv) a complete bipartite graph $K_{n,n}$

15. (a) Let X be a continuous random variable with a probability density function. (CO5, K5)

$$f_x(x)=\begin{cases} x^2\left(2x+\frac{3}{2}\right) & 0\le x\le 1 \\ 0 & otherwise \end{cases}$$

Find variance of Y if $Y=\frac{2}{x}+3$

Or

(b) A diagnostic test has a probability of 0.95 of giving the correct diagnosis. The incidence of disease in the population is 0.005. What is the probability that a person with a positive test result has the disease? (CO5, K5)

Section C (5 × 8 = 40)

Answer **all** the questions, not more than 1000 words each.

16. (a) Use the indirect method to show that $r\rightarrow\sim q, rVs$, $s\rightarrow\sim q,\ p\rightarrow q\Rightarrow\sim p$. (CO1, K1)

Or

(b) Prove that $\forall x(p(x)\rightarrow(Q(y)\wedge R(x)))$, $\exists xP(x)\Rightarrow Q\ (y)\wedge\exists x(P(x)\wedge R(x))$ (CO1, K1)

17. (a) The relation R on the set A = {1,2,3,4,5} is defined by the rule *(a, b)* ∈ R, if 3 divides $a - b$. (CO2, K3)

(i) List the elements of R and R^{-1}

(ii) Find the domain and range of R,

(iii) Find the domain and range of R^{-1}

(iv) List the elements of the complement of R.

Or

(b) Determine whether the relation R on the set of all integers is reflexive, symmetric and/or transitive, where aRb if and only if (CO2, K3)

(i) a is a multiple of b,

(ii) $a \equiv b \pmod 7$;

(iii) $|a-b|=1$

(iv) $a=b^2$

18. (a) State and prove the Lagrange's theorem. (CO3, K4)

Or

(b) Show that the set Q^+ of all positive rational numbers forms an abelian group under the operation * defined $a * b = \frac{1}{2}ab;\ a,b \in Q^+$ (CO3, K4)

19. (a) Let A be the adjacency matrix of a digraph G. Then prove that the element in the i-throw and j-th column of A^n is equal to the number of paths of length n from the i-th node to j-th node. (CO4, K2)

Or

(b) Prove that the number of edges of a tree of order n is n-1. (CO4, K2)

20. (a) A random variable X has the following probability function. (CO5, K5)

Value of X	0	1	2	3	4	5	6	7	8
P(X=x)	A	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$

(i) Find the value of a?

(ii) $P(X<3);\ P(0<X<3);\ P(X \geq 3)$

(iii) Find the cumulative distribution of X.

Or

R2019

(b) Let X be a random variable with a probability density function given by (CO5, K5)

$$f_x(x) = \begin{cases} cx^2 & |x| \le 1 \\ 0 & otherwise \end{cases}$$

Find

(i) The value of c?

(ii) $E(X)$ and $Var(X)$

(iii) $P\left(X \ge \frac{1}{2}\right)$.

———————

R2020	Sub. Code
	541551

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Computer Applications

Elective – COMPUTER NETWORKS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 1 = 10)$

Answer **all** question by choosing the correct option.

1. Which layer of the OSI model is responsible for error detection and correction? (CO1, K2)

   (a) Transport Layer (b) Network Layer

   (c) Data Link Layer (d) Physical Layer

2. What does the Physical Layer use to represent data? (CO1, K2)

   (a) Symbols (b) Bits

   (c) Frames (d) Packets

3. What is the primary responsibility of Media Access Control (MAC) sublayer? (CO2, K4)

   (a) Frame addressing (b) Data compression

   (c) Encryption (d) Routing

4. Which of the following is NOT a function of the Network Layer? (CO2, K4)

   (a) Packet forwarding (b) Routing

   (c) Error correction (d) Fragmentation

5. ———————— algorithm makes the routing decisions based on the topology and network traffic. (CO3, K4)

(a) Adaptive Routing Algorithm

(b) Non-Adaptive Routing Algorithm

(c) Static routing Algorithm

(d) None

6. What does the term "link-state" refer to in routing algorithms? (CO3, K4)

(a) The state of the end devices

(b) The state of the links in the network topology

(c) The status of data packets

(d) The state of network congestion

7. Which protocol is used for reliable, connection-oriented communication at the Transport Layer? (CO4, K2)

(a) UDP (b) ICMP

(c) TCP (d) IP

8. Which of the following protocols operates at the Application Layer? (CO4, K2)

(a) TCP (b) IP

(c) HTTP (d) Ethernet

9. Which of the following is NOT a symmetric key algorithm? (CO5, K5)

(a) Blowfish (b) Triple DES

(c) RSA (d) RC4

10. What is the main principle behind a transposition cipher? (CO5, K5)

(a) Replacing each letter with another letter

(b) Rearranging the positions of letters in the plaintext

(c) Converting plaintext to binary

(d) Combining plaintext with a random key

Section B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Examine the various Network topologies. (CO1, K2)

Or

(b) How do guided media differ from unguided media? (CO1, K2)

12. (a) Distinguish between flow control and error control in DLL. (CO2, K4)

Or

(b) What is meant by bit stuffing? Give an example. (CO2, K4)

13. (a) What are the network layer design issues explain them? (CO3, K4)

Or

(b) Explain packet switching in detail. (CO3, K4)

14. (a) Write in detail about performance issues of transport layer. (CO4, K2)

Or

(b) List out the four main properties of HTTP.(CO4, K2)

15. (a) List out the Differences between symmetric and asymmetric encryption. (CO5, K5)

Or

(b) Explain in detail different passive and active attacks. (CO5, K5)

Section C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Draw the OSI network architecture and explain the functionalities of every layer in detail. (CO1, K2)

Or

(b) Compare OSI and TCP/IP Network models. (CO1, K2)

17. (a) Explain in detail the stop-and-wait. Go-back N and selective repeat ARQ protocols in DLL. (CO2, K4)

Or

(b) Explain the various types of error Discuss the various types of Detection and correction. (CO2, K4)

18. (a) List and explain congestion control algorithms in network layer. (CO3, K4)

Or

(b) Explain distance vector routing algorithm.(CO3, K4)

19. (a) Illustrate in detail about function and structure of e-mail protocol. (CO4, K2)

Or

(b) Discuss about File Transfer Protocol with neat diagram. (CO4, K2)

20. (a) Explain RSA algorithm in detail with an example. (CO5, K5)

Or

(b) Write about elliptic curve architecture in detail and how they are useful for cryptography. (CO5, K5)

———————

R2021	Sub. Code
	541301

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2024

Third Semester

Computer Applications

DATA SCIENCE AND BIG DATA ANALYTICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 1 = 10)$

Answer **all** the questions by choosing the correct option.

1. ———— data is a common phenomenon that bears closer scrutiny. (CO1, K1)
   (a) Semi structured
   (b) Quasi-structured
   (c) Structured
   (d) None
2. ———— forecast future product sales and revenue more accurately than extending a simple trend line. (CO1, K1)
   (a) Time Series Analysis
   (b) Temporal Data
   (c) Predictive
   (d) None
3. ———— error is the rejection of the null hypothesis when the null hypothesis is true. (CO2, K2)

   (a) Type I (b) Type II
   (c) Type III (d) Type IV

4. ———— is a simple and widely used visualization for finding the relationship among multiple variables. (CO2, K2)

(a) Density plots (b) Scatterplot

(c) Plot (d) None

5. ———— is an analytical technique used to model the relationship between several input variables and a continuous outcome variable. (CO3, K3)

(a) Linear regression (b) Central Tendency

(c) Skewness (d) None

6. ———— refers to individual entities that contain some kind of relationship. (CO3, K3)

(a) Itemset (b) Dataset

(c) Code (d) None

7. A node without further branches is called, (CO4, K5)

(a) Root Node (b) Leaf Node

(c) Sub Node (d) Zero Node

8. ———— is the task of separating words from the body of text. (CO4, K5)

(a) Synchronization (b) Tokenization

(c) Parsing (d) Stemming

9. ———— is an example of the NoSQL. (CO5, K2)

(a) Apache (b) HBase

(c) HDFS (d) MapReduce

10. ———— is an open-source library for scalable in-database analytics. (CO5, K2)

(a) MADlib (b) Apache

(c) HBase (d) HDFS

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Narrate the types of Data Repositories. (CO1, K1)

Or

(b) What is an analytic sandbox, and why is it important? (CO1, K1)

12. (a) What R function is used to encode a vector as a category? (CO2, K2)

Or

(b) With suitable example explain Null Hypotheses and Alternative Hypotheses. (CO2, K2)

13. (a) Describe how logistic regression can be used as a classifier. (CO3, K3)

Or

(b) Narrate the general logic behind association rules. (CO3, K3)

14. (a) What are the main challenges of text analysis? (CO4, K5)

Or

(b) Explain the trade-offs for precision and recall. (CO4, K5)

15. (a) With suitable example explain the Decision Tree structure. (CO5, K2)

Or

(b) Which classifier is considered computationally efficient for high-dimensional problems? Why? (CO5, K2)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Describe the challenges of the current analytical architecture for data scientists. (CO1, K1)

Or

(b) What are the three characteristics of Big Data, and what are the main considerations in processing Big Data? (CO1, K1)

17. (a) Describe the R Data Types in detail. (CO2, K2)

Or

(b) Briefly explain the various Statistical Methods for Evaluation. (CO2, K2)

18. (a) Discuss how the ROC curve can be used to determine an appropriate threshold value for a classifier. (CO3, K3)

Or

(b) Write down the Apriori algorithm. (CO3, K3)

19. (a) Discuss ARIMA Model. (CO4, K5)

Or

(b) Describe the text analysis steps. (CO4, K5)

20. (a) Explain the Data Analytics Lifecycle. (CO5, K2)

Or

(b) Describe four common deliverables for an analytics project. (CO5, K2)

———————

R2022	Sub. Code
	541302

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2024

Third Semester

Computer Applications

PYTHON PROGRAMMING

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the questions by choosing the correct answer.

1. Which one of the following is the correct extension of the Python file? (CO1, K1)

   (a) .py (b) .python

   (c) .p (d) None of these

2. Which character is used in Python to make a single line comment? (CO1, K1)

   (a) / (b) //

   (c) # (d) !

3. What does the len( ) function do in Python? (CO2, K3)

   (a) Returns the length of a string

   (b) Converts a string to uppercase

   (c) Checks if a value is equal to another value

   (d) Removes white space from a string

4. What is the correct way to access the value of a dictionary in Python? (CO2, K1)

   (a) dictionary[key]

   (b) dictionary.value(key)

   (c) dictionary[key].value

   (d) dictionary.key

5. Which keyword is used for conditional statements in Python? (CO3, K3)

(a) While (b) for

(c) If (d) Switch

6. What will the following code snippet print? (CO3, K1)

```
x = 10
if x <5:
  print("x is less than 5")
elifx> 15:
   print("x is greater than 15")
else:
  print("x is between 5 and 15")
```

(a) x is less than 5

(b) x is greater than 15

(c) x is between 5 and 15

(d) No output

7. What is used to create an object? (CO4, K1)

(a) Class

(b) Constructor

(c) User-defined functions

(d) In-built functions

8. What is Instantiation in terms of OOP terminology? (CO4, K1)

(a) Deleting an instance of class

(b) Modifying an instance of class

(c) Copying an instance of class

(d) Creating an instance of class

9. Which module is commonly used for database connectivity in Python? (CO5, K3)

(a) dbconnect (b) pydb

(c) sqlite3 (d) dbconnector

10. The full form of CSV is : (CO5, K3)

(a) Comma Separated Values

(b) Comma Separated Value

(c) Comma Separated Variables

(d) Comma Separate Values

Part B ($5 \times 5 = 25$)

Answer **all** the questions not more than 500 words each.

11. (a) List various types of operators in Python. (CO1, K2)

Or

(b) What are the features of python? (CO1, K1)

12. (a) Point out the methods used in Tuples. (CO2, K6)

Or

(b) What is recursive function? Give an example. (CO2, K3)

13. (a) Explain with an example break and continue statements using while loop. (CO3, K3)

Or

(b) Write a Python program to find the sum of N natural numbers. (CO3, K6)

14. (a) Write a short note on Data hiding. (CO4, K3)

Or

(b) With suitable example explain method overriding. (CO4, K6)

15. (a) What is CSV file? What are its characteristics? (CO5, K3)

Or

(b) Write a program to copy the data from "data.csv" to "temp.csv". (CO5, K3)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Explain python Standard Data Types. (CO1, K2)

Or

(b) Write a python program to find the greatest among three numbers. (CO1, K3)

17. (a) With suitable example explain the User defined function. (CO2, K3)

Or

(b) Explain the string handling functions in detail. (CO2, K3)

18. (a) Explain the loops statement in python. (CO3, K3)

Or

(b) Write a python program to find the given number is positive, negative or zero using Nested if conditional control structure. (CO3, K6)

19. (a) Describe the built-in class attributes. (CO4, K3)

Or

(b) Explain (CO4, K3)

(i) Class Definition

(ii) Object creation

20. (a) Elaborate on python database connectivity. (CO5, K6)

Or

(b) Write a program to read all content of "student.csv" and display records of only those students who scored more than 80 marks. Records stored in students is in format : Rollno, Name, Marks (CO5, K6)

———————

R2023	Sub. Code
	541303

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2024

Third Semester

Computer Applications

SOFTWARE ENGINEERING

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the questions by choosing the correct option.

1. What is the primary goal of software engineering? (CO1, K1)

   (a) To develop software that meets user requirements

   (b) To develop software that is bug-free

   (c) To develop software that is easy to use

   (d) To develop software that is inexpensive

2. Which of the following is not a software development life cycle phase? (CO1, K1)

   (a) Requirements analysis

   (b) Design

   (c) Testing

   (d) Execution

3. _____ is the primary goal of requirement engineering (CO2, K4)

(a) To develop software that meets user expectations

(b) To document software functionalities

(c) To identify, analyze, document, and manage requirements

(d) To design the user interface of the software

4. Requirements elicitation means (CO2, K4)

(a) Gathering of requirements

(b) Capturing of requirements

(c) Understanding of requirements

(d) All of the above

5. What is the purpose of architectural design in software engineering? (CO3, K4)

(a) To specify low-level details of software components

(b) To define the structure and organization of the software system

(c) To design the user interface of the software

(d) To conduct unit testing

6. Design engineering activity deals entirely with the _____ domain (CO3, K4)

(a) Problem b (b) Solution

(c) Both (d) None

7. Unit testing is done by (CO4, K2)

(a) User (b) Developer

(c) Tester (d) None of above

8. White-box testing is also called, (CO4, K2)

(a) functional testing

(b) structural testing

(c) fault oriented testing

(d) none

9. What is Agile software development? (C05, K1)

(a) A sequential development process

(b) A flexible and iterative approach to software development

(c) A document-driven development approach

(d) A rigid and predictive approach to software development

10. What is a Scrum in Agile methodology? (CO5, K1)

(a) A type of sprint planning meeting

(b) A type of agile framework for managing work

(c) A type of code review process

(d) A type of software testing technique

Part B ($5 \times 5 = 25$)

Answer **all** questions not more than 500 words each.

11. (a) Write a brief note on waterfall model. (CO1, K2)

Or

(b) Define software process. State the important features of a process. (CO1, K2)

12. (a) Briefly explain the requirement engineering tasks. (CO2, K4)

Or

(b) Write a short note on validating requirement. (CO2, K4)

13. (a) Briefly explain golden rules user interface design. (C03, K4)

Or

(b) What are the software quality guidelines and attributes used in software design? (CO3, K4)

14. (a) Compare black box testing and white box testing. (CO4, K2)

Or

(b) Explain the software quality guidelines and attributes. (CO4, K2)

15. (a) Elaborate on AGILE metrics. (CO5, K5)

Or

(b) How is agile methodology different from traditional methodologies? (CO5, K5)

Part C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) Explain in detail about incremental process model. (CO1, K2)

Or

(b) Identify the umbrella activities in software engineering process. (CO1, K2)

17. (a) Explain about the various design concepts considered during design. (CO2, K4)

Or

(b) Discuss object oriented analysis in detail. (CO2, K4)

18. (a) Explain all the design issues. (CO3, K4)

Or

(b) Discuss about architectural patterns with suitable example. (CO3, K4)

19. (a) Briefly describe software testing strategies. (CO4, K2)

Or

(b) Justify the importance of testing process. (CO4, K2)

20. (a) Describe the Scrum framework in Agile development. (CO5, K5)

Or

(b) Define Extreme Programming (XP) and briefly explain its core principles. (CO5, K5)

———————

R2024	Sub. Code
	541304

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2024.

Third Semester

Computer Applications

INFORMATION AND CYBER SECURITY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions by choosing the correct answer.

1. Which of the following slows the cryptographic algorithm? (CO1, K1)

   (1) Increase in Number of rounds

   (2) Decrease in Block size

   (3) Decrease in Key Size

   (4) Increase in Sub key Generation

   (a) (1) and (3) (b) (2) and (3)

   (c) (3) and (4) (d) (2) and (4)

2. Which of the following was the first diagram substitution cipher? (CO1, K1)

   (a) Auto key cipher

   (b) Hill cipher

   (c) One time pad cipher

   (d) Play fair cipher

3. In AES the 4×4 bytes matrix key is transformed into a key of size (CO2, K6)

(a) 32 words (b) 64 words

(c) 54 words (d) 44 words

4. In Elgamal cryptosystem, given the prime p = 31. What is the respective plaintext character for C = (27, 20)? (CO2, K6)

(a) H (b) L

(c) O (d) M

5. What bit hash value does Secure Hash Algorithm (SHA) produce? (CO3, K6)

(a) 96 (b) 128

(c) 160 (d) 256

6. Which attack requires the least effort/computations? (CO3, K6)

(a) Pre-image (b) Second Pre-image

(c) Collision (d) All required the same effort

7. What does a Kerberos authentication server issue to a client that successfully authenticates? (CO4, K3)

(a) A ticket-granting ticket

(b) A master password

(c) An encryption key

(d) A digital certificate

8. What is a CRL? (CO4, K3)

(a) Certified Recursive Listener

(b) Certificate Revocation List

(c) Certificate Recording Language

(d) Caramel Raspberry Lemon

9. Compromising confidential information comes under ————————. (CO5, K6)

(a) Bug (b) Threat

(c) Vulnerability (d) Attack

10. Data leakage is popularly known as ————————. (CO5, K6)

(a) Data theft

(b) Data crack

(c) Low and slow data theft

(d) Slow data theft

Part B ($5 \times 5 = 25$)

Answer **all** questions not more than 500 words each.

11. (a) An affine cipher with modulus 26 encrypts 4 as 2 and 7 as 17. Determine the key. (CO1, K1)

Or

(b) Discuss the security of additive, multiplicative and affine ciphers against known plaintext attacks. (CO1, K1)

12. (a) Consider an encryption system in which the entropy of the plain text is 32 bits per 128-bit block and in which the AES algorithm is used with a single 128 bit key. Assuming that all keys are equally likely, calculate the unicity distance of this cipher system. (CO2, K6)

Or

(b) Show the result of passing 111111 and 101100 through S-box 3. and S-box 4 respectively. (CO2, K6)

13. (a) Explain the concept of image downgrading and covert channel. (CO3, K6)

Or

(b) Differentiate weak and strong collisions resistance. (CO3, K6)

14. (a) Discuss various Steganalysis attack methods. (CO4, K3)

Or

(b) Explore how attackers use backdoors and evasion techniques to counter incident response measures even long after a data breach are disclosed. (CO4, K4)

15. (a) How is cyber resilience reflected in the Cyber security Framework? (CO5, K6)

Or

(b) Explain the requirement of understanding various file systems used in view of cyber forensics. (CO5, K6)

Part C ($5 \times 8 = 40$)

Answer **all** questions not more than 1000 words each.

16. (a) Use the playfair cipher to encipher the message 'The key is hidden in your exam pad". The secret key can be made by filling the first and part of the second row with the word "SECURITY" and filling the rest of the matrix with the rest of the alphabet. (CO1, K1)

Or

(b) Hill ciphers and multiplicative ciphers are very similar, Hill ciphers are block ciphers using multiplication of matrices: multiplicative ciphers are stream ciphers using multiplication of scalars. (CO1, K1)

(i) Define a block cipher that is like an additive cipher using the addition of matrices.

(ii) Define a block cipher that is like an affine cipher using the multiplication and addition of matrices.

17. (a) Explain RSA cryptosystem. Suppose Jennifer creates a pair of keys for herself. She chooses p = 397 and q = 401. She calculates n = 397 × 401= 159197. She then calculates φ(n) = 396 × 400 = 158400. She then chooses e = 343 and d = 12007. Show how Ted can send a message to Jennifer if he knows e and n. (CO2, K6)

Or

(b) Write and explain the pseudocode for knapsacp Sum and inv-knapsacp Sum for a super increasing k-tuple. Assume that a = [17, 25, 46, 94, 201, 400] and s = 272 are given. Show how the tuple x is found using inv inv-knapsacp Sum routine.(CO2, K6)

18. (a) Explain various requirements and algorithmic design issues in watermarking. (CO3, K6)

Or

(b) Explain briefly the concepts: one-way Function, one-way hash function, trapdoor one-way function.

(CO3, K6)

19. (a) What requirements should a digital signature scheme should satisfy? (CO4, K6)

Or

(b) Explain the need of DNA as a Biometric Identifier. Though these methods have been commercialized and are being incorporated into systems that require accurate on-site personal authentication. Discuss how they are prone to "Birthday Paradox".

(CO4, K6)

20. (a) Device security incident response plan on an on-going basis to Leverage a living document – driving recurring detection and response activities by performing ongoing detection and incident response activities, to improve IT and security hygiene and better protect the organization from unknown threats, hidden attackers and potentially prevent a data breach (CO5, K6)

Or

(b) James and Alexander are having a debate on computer and network security. James says that it is the job of security professionals to find all vulnerabilities and every threat and make sure the system is always 100% secure. Do you agree with James? Explain your answer with 10 reasons.

(CO5, K6)

R2025	Sub. Code
	541558

M.C.A. DEGREE EXAMINATION, NOVEMBER – 2024.

Third Semester

Computer Applications

Elective – VIRTUAL REALITY AND AUGMENTED REALITY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the questions by choosing the correct option.

1. What is virtual reality (VR)? (CO1, K1)
   (a) A technology that allows users to experience the real world
   (b) A system that creates artificial intelligence
   (c) A simulated environment that can be similar to or different from the real world
   (d) A type of augmented reality

2. What is the primary difference between Augmented Reality (AR) and Virtual Reality (VR)? (CO1, K1)
   (a) AR creates a completely immersive virtual environment, while VR overlays digital information onto the real world
   (b) AR overlays digital information onto the real world. while VR creates a completely immersive virtual environment
   (c) Both AR and VR are the same technologies with different names
   (d) AR and VR both rely exclusively on haptic feedback

3. What does SLAM stand for in the context of AR?(CO2, K1)
   (a) Simultaneous Localization and Mapping
   (b) Spatial Learning and Mapping
   (c) Systematic Localization and Measurement
   (d) Sensor Location and Mapping

4. Which device is commonly used for immersive VR experiences? (CO2, K1)
   (a) Smartphone (b) AR Glasses
   (c) VR Headset (d) Smartwatch

5. In VR, what is the term for the virtual space that users can interact with? (CO3, K1)
   (a) User Interface (b) Augmented Environment
   (c) Virtual World (d) Mixed Reality

6. Which of the following industries has not extensively adopted virtual reality technology? (CO3, K1)
   (a) Education (b) Real estate
   (c) Gaming (d) Manufacturing

7. Which of the following is an example of a VR development tool? (CO4, K1)
   (a) Unity (b) Photoshop
   (c) Excel (d) Word

8. What is the term for the process of mapping real-world objects into a virtual environment? (CO4, K1)
   (a) Object scanning (b) Environment modeling
   (c) Photogrammetry (d) Motion capture

9. What is the term for the realistic representation of human-like avatars in virtual reality? (CO5, K1)
   (a) Virtual embodiment
   (b) Avatar synthesis
   (c) Character animation
   (d) Digital cloning

10. What is the term for the technique used to create a sense of depth and dimension in virtual reality? (CO5, K1)

(a) 3D modelling (b) Stereoscopic rendering

(c) Motion tracking (d) Spatial audio

Part B ($5 \times 5 = 25$)

Answer **all** the question not more than 500 words each.

11. (a) Outline the features of VR systems. (CO1, K2)

Or

(b) Assess in brief the fundamental needs of the virtual reality environment. (CO1, K2)

12. (a) Define perspective projection in detail. (CO2, K1)

Or

(b) Define tracking in VR with a suitable example. (CO2, K2)

13. (a) Compare and contrast Body track and Hand Gesture interactive techniques of VR. (CO3, K2)

Or

(b) Explain the various schemes for describing 3D surface boundaries. (CO3, K2)

14. (a) Address the challenges in AR. (CO4, K2)

Or

(b) Compare and contrast the object and user presence. (CO4, K2)

15. (a) Explain in detail the MultiGen paradigm. (CO5, K2)

Or

(b) Explain the functionality of Unity Development Tool. (CO5, K2)

Part C (5 × 8 = 40)

Answer **all** the question not more than 1000 words each.

16. (a) Explain the role of every functional component of VR. (CO1, K2)

Or

(b) Briefly explain the virtual world generator (VWG). (CO1, K2)

17. (a) Analyze the role of Sensors in gathering Environmental Information. (CO2, K4)

Or

(b) Analyze in detail about classification and fusion of senses. (CO2, K4)

18. (a) Explain about the different modes of interaction associated with VR technology. (CO3, K4)

Or

(b) Explain in detail on rotation about an arbitrary axis with an illustrative diagram. (CO3, K2)

19. (a) Address and analyze in detail various types of interaction in AR. (CO4, K4)

Or

(b) Analyze in detail about different types of AR methods. (CO4, K4)

20. (a) Examine any of four virtual reality development tools and frameworks in detail. (CO5, K2)

Or

(b) Explain in detail the role and functionality of the Vega visualization development toolkit. (CO5, K2)