B.L.D.E.A's V.P.Dr.P.G.HALAKATTI COLLEGE OF ENGINERING AND TECHNOLOGY VIJYAPUR 586103

INDEX FILE QUESTION PAPERS JUN/JUL 2023

M.C.A.

/2022 - I sem. MCA

CBCS SCHEME

USN | | | | | | | | | | |

20MCA11

First Semester MCA Degree Examination, June/July 2023
Data Structures with Algorithms

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define Stack. Explain with code primitive operating on stack. **(08 Marks)**
b. Write a C program to evaluate a postfix expression. **(06 Marks)**
c. Illustrate with an example conversion from Infix to postfix expression. **(06 Marks)**

OR

2 a. Explain linear and nonlinear data-structures with example. **(08 Marks)**
b. Write a C program to convert an expression from infix to postfix. **(06 Marks)**
c. Explain different ways of stack representation in memory. **(06 Marks)**

Module-2

3 a. Define recursion. Write a recursive functions for factorial of a number tower of honoi. Give illustration with example. **(10 Marks)**
b. Write a short note on priority queues, double ended queue, along with code snippet. **(10 Marks)**

OR

4 a. Define circular queue. Explain its advantages over the ordinary queue. Write a function to demonstrate insert, delete operation on circular queue. **(10 Marks)**
b. Write a C program for demonstrate applications queue. **(10 Marks)**

Module-3

5 a. What is disadvantage of array? Write a note on malloc, calloc, realloc free with syntax and example. **(10 Marks)**
b. Write a C program for demonstrating singley linked list with insert front delete front and display node function. **(10 Marks)**

OR

6 a. Write a C program for demonstrating queue with insert, delete display operation using linked list. **(10 Marks)**
b. Write a note on header node with example for it. **(04 Marks)**
c. Write code snippet for inserting and rending nocks in linked list based on data. **(06 Marks)**

Module-4

7 a. Explain various steps in fundamental of algorithmic problem solving. **(10 Marks)**

b. Explain any 5 important problem types in the study of algorithms. **(10 Marks)**

OR

8 a. Discuss various asymptotic notation and basic efficiency classes. **(10 Marks)**

b. Explain mathematical analysis of recursive algorithm with suitable example for it. **(06 Marks)**

c. Differentiate recursive and non recursive algorithm. **(04 Marks)**

Module-5

9 a. Define brute force technique of problem solving. Write algorithm for selection sort, bubble sort. **(10 Marks)**

b. Write an algorithm for quick sort and analyze its efficiency. **(10 Marks)**

OR

10 a. Write an algorithm for merge sort, find time complexity of merge sort and example for it. **(10 Marks)**

b. Write Krushkal's algorithm and explain Krushkal's algorithm with suitable example for it. **(10 Marks)**

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CBCS SCHEME

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20MCA12

First Semester MCA Degree Examination, June/July 2023
Operating System with UNIX

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. What is Operating System? Explain operating system structure. **(10 Marks)**
b. What is system call? Explain different types of system calls. **(10 Marks)**

OR

2 a. Explain First come, First served and Round Rabin (RR) scheduling algorithm with example. **(10 Marks)**
b. Describe process synchronization with example. **(10 Marks)**

Module-2

3 a. What is Deadlock? Explain dead lock characterization. **(10 Marks)**
b. Explain deadlock handling and prevention with example. **(10 Marks)**

OR

4 a. Describe demand paging with example. **(10 Marks)**
b. What is Thrashing? Explain with example. **(10 Marks)**

Module-3

5 a. Explain the Unix file system, with a neat diagram and explain the parent child relationship. **(10 Marks)**
b. Explain absolute and relative pathname with example. **(10 Marks)**

OR

6 a. Explain Hard link and soft link with example. **(10 Marks)**
b. What is Redirection? Explain with example. **(10 Marks)**

Module-4

7 a. What is process? Explain mechanism of process creation. **(10 Marks)**
b. Explain the following commands with example:
i) at ii) batch iii) cron iv) PS v) kill **(10 Marks)**

OR

8 a. What is shell scripts? Explain shell variable with example. **(10 Marks)**
b. Write a shell script that takes a valid directory name as a argument recursively descend all the sub directories, finds the maximum length of any file in that hierarchy and writes this maximum value to the standard output. **(10 Marks)**

Module-5

9 a. Explain structure of an awk script with example. **(10 Marks)**
b. Explain Built-in variables of awk with example. **(10 Marks)**

OR

10 a. Explain sh and export command with example. **(10 Marks)**
b. Write an awk script to compute gross salary of an employee accordingly to rule given below.
If basic salary > = 15000 then HRA = 20% of basic and DA = 50% of basic.
If basic salary < 15000 then HRA = 15% of basic and DA = 45% of basic. **(10 Marks)**

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CBCS SCHEME

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20MCA14

First Semester MCA Degree Examination, June/July 2023
Mathematical Foundation for Computer Application

Time: 3 hrs. Max. Marks: 100

Note: ***1. Answer any FIVE full questions, choosing ONE full question from each module.***
2. Use of normal distribution tables is permitted.

Module-1

1 a. If A, B and C are non-empty sets, then prove that :
(i) $A - (B \cap C) = (A - B) \cup (A - C)$
(ii) $\overline{A \cup (B \cap C)} = (\overline{C} \cup \overline{B}) \cap \overline{A}$ **(06 Marks)**

b. How many integers between 1 and 300 (inclusive) are:
(i) Divisible by at least one of 5, 6, 8?
(ii) Divisible by none of 5, 6, 8? **(07 Marks)**

c. Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$. **(07 Marks)**

OR

2 a. (i) Define power set of a set. Find the power set of the set $A = \{1, 2, 3\}$.
(ii) Find the sets A and B if $A - B = \{1, 2, 4\}$, $B - A = \{7, 8\}$, $A \cup B = \{1, 2, 4, 5, 7, 8, 9\}$. **(06 Marks)**

b. A survey of 500 television viewers of a sports channel produced the following information 285 watch cricket, 195 watch hockey, 115 watch football, 45 watch cricket and football, 70 watch cricket and hockey, 50 watch hockey and football and 50 do not watch any of the three kinds of games:
(i) How many viewers in the survey watch all three kinds of games?
(ii) How many viewers watch exactly one of the sports? **(07 Marks)**

c. If we select 10-points in the interior of an equilateral triangle of side 1m. Show that there must be at least two points whose distance apart is less than 1/3 m. **(07 Marks)**

Module-2

3 a. Define tautology and contradiction. Prove that, for any propositions p, q, r. The compound proposition $[(p \vee q) \wedge \{(p \rightarrow r) \wedge (q \rightarrow r)\}] \rightarrow r$ is a tautology. **(06 Marks)**

b. Prove the following logical equivalence, without using truth tables;
$(p \rightarrow q) \wedge [\sim q \wedge (r \vee \sim q] \Leftrightarrow \sim (q \vee p)$ **(07 Marks)**

c. Give a direct proof of the statement:
(i) "The square of an odd integer is an odd integer"
(ii) For all integers K and ℓ, if K and ℓ are both odd, then $(K + \ell)$ is even and $(K\ell)$ is odd. **(07 Marks)**

OR

4 a. Write down the truth table for converse, inverse and contrapositive. State the converse, inverse and contrapositive of the following conditional, "If a quadrilateral is a parallelogram, then its diagonals bisect each other". **(06 Marks)**

b. Find the validity of the arguments:
I will get grade A in this course or I will not graduate
If I do not graduate, I will join the army
I got graduate

∴ I will not join the army

(07 Marks)

c. Let x be a specified number. Write down the negation of the following conditionals:
(i) "If x is an integer, then x is a rational number"
(ii) "If x is not a real number, then it is not a rational number and not an irrational number".

(07 Marks)

Module-3

5 a. Let A = {1, 2, 3}, B = {1, 2, 3, 4}. The relations R and S from A to B are represented by the following matrices. Determine the relations $\overline{R}$, $R \cup S$, $R \cap S$ and S^C and also their matrix representations.

$$M_R = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}; \quad M_S = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \end{bmatrix}$$

(06 Marks)

b. Define partially order set. Draw the Hasse diagram representing the positive divisors of 36.

(07 Marks)

c. Let A = {1, 2, 3, 4, 5}, define a relation R on A × A by (x_1y_1) R (x_2y_2) if and only if $x_1 + y_1 = x_2 + y_2$.

(07 Marks)

OR

6 a. Let A = {1, 2, 3, 4, 6} and R be a relation on A defined by aRb if and only if a is multiple of b. Represent the relation R as a matrix and draw its digraph.

(06 Marks)

b. Let A = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}, define the relation R by (x, y) ∈ R if and only if (x – y) is multiple of 5. Verify that R is an equivalence relation. Find the partition of A induced by R.

(07 Marks)

c. Let A = {1, 2, 3, 4} and R, S are relations on A defined by R = {(1, 2), (1, 3), (2, 4), (4, 4)}, S = {(1, 1), (1, 2), (1, 3), (1, 4), (2, 3), (2, 4)}, find RoS, SoR, R^2, S^2. Write down their matrices.

(07 Marks)

Module-4

7 a. The probability density function P(X) of a variate X is given by the following table:

X	0	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K	13k

For what value of K, does this represent a valid probability distribution? Also find $P(X < 4)$, $P(X \geq 5)$ and $P(3 < X \leq 6)$.

(06 Marks)

b. In a large number of parts manufactured by a machine, the mean number of defectives in a sample of 20 is 2. Out of 1000 such samples, how many would be expected to contain at least 3 defective parts.

(07 Marks)

c. If x is an exponential variate with mean 4, evaluate the followings:
(i) $P(0 < x < 1)$
(ii) $P(x > 2)$
(iii) $P(-\infty < x < 10)$

(07 Marks)

OR

8 a. A random variable x has the density function

$$P(x)=\begin{cases} Kx^2, & -3 \le x \le 3 \\ 0, & \text{elsewhere} \end{cases}$$

Evaluate K and find (i) $P(1 \le x \le 2)$ (ii) $P(x \le 2)$ (iii) $P(x > 1)$ **(06 Marks)**

b. The number of telephone lines busy at an instant of time is a binomial varaite with $p = 0.2$, if an instant of time, 10-lines are chosen at random, what is the probability that :
(i) 5 lines are busy (ii) At most 2-lines are busy (iii) All lines are busy **(07 Marks)**

c. The weekly wages of workers in a company are normally distributed with mean of Rs.700 and standard deviation of Rs.50. Find the probability that the weekly wage of a randomly chosen worker is: (i) Between Rs.650 and Rs.750 (ii) More than Rs.750
Given $\phi(1) = 0.3413$. **(07 Marks)**

Module-5

9 a. Define the following with an example for each :
(i) Complete graph (ii) Regular graph (iii) Bipartite graph **(06 Marks)**

b. Determine whether the graphs shown in Fig.Q9(b) are isomorphic:

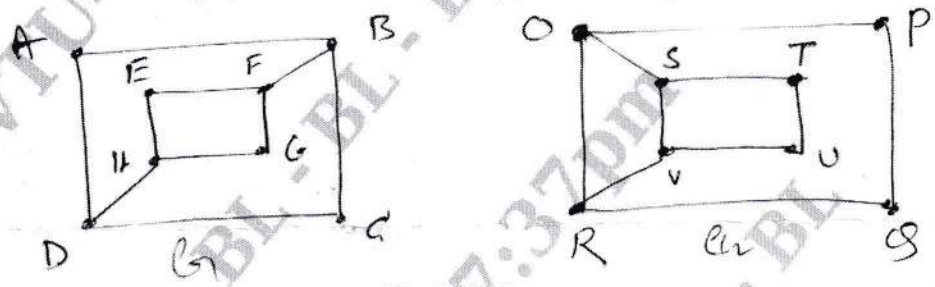

Fig.Q9(b) **(07 Marks)**

c. Explain Konisberg bridge problem. **(07 Marks)**

OR

10 a. Define the following with an example each:
(i) Euler circuit
(ii) Hamilton cycle
(iii) Hamilton path **(06 Marks)**

b. Show that complete graph K_5 (namely, the Kuratowski's first graph) is a non-linear graph. **(07 Marks)**

c. Find the chromatic numbers of the following graphs shown in Fig.Q10(c):

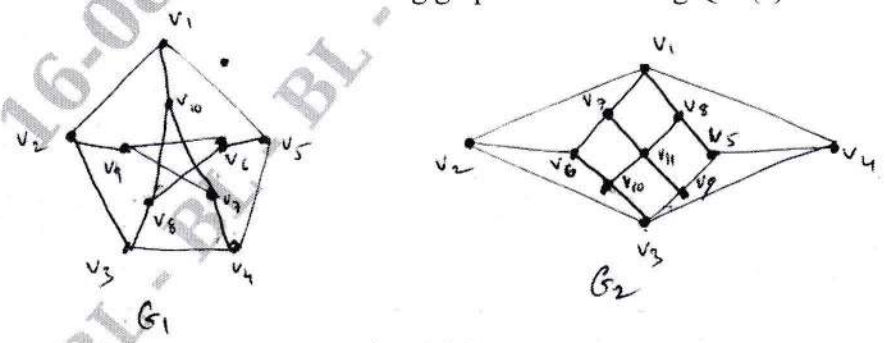

Fig.Q10(c) **(07 Marks)**

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CBCS SCHEME

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22MCA11

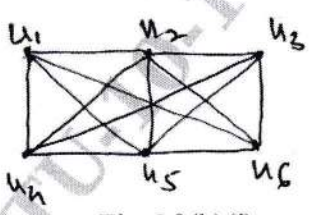
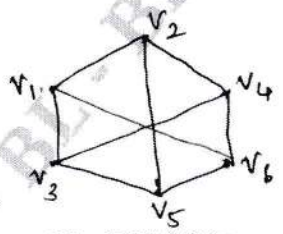
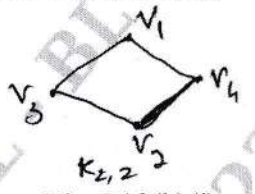
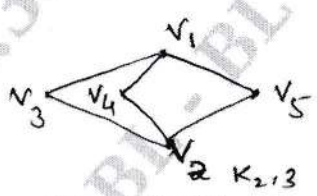
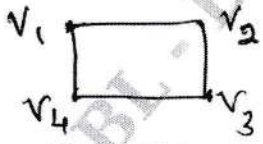
First Semester MCA Degree Examination, June/July 2023
Mathematical Foundation for Computer Applications

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define (i) Set (ii) Power set (iii) Subset , with an example each	6	L3	CO1
	b.	For any sets A and B, prove that (i) $\overline{A \cup B} = \overline{A} \cap \overline{B}$ (ii) $\overline{A \cap B} = \overline{A} \cup \overline{B}$	7	L3	CO1
	c.	Find all the eigen values and eigen vector corresponding to the largest eigen value of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$	7	L3	CO1
		OR			
Q.2	a.	State pigeonhole principle. ABC is an equilateral triangle whose sides are of length 1 m. If we select 10 points inside the triangle, prove that atleast 2 of these points are such that the distance between them is less than 1/3 m.	6	L3	CO1
	b.	In a survey of 260 students the following data were obtained 64 has taken maths course, 94 taken C.S. 58 had taken Business course, 24 taken maths and business, 26 has taken maths and C.S., 22 had taken C.S. and Business course, 14 had taken all the three courses. Find the number of students who had taken, (i) Only the C.S. (ii) None of the course	7	L3	CO1
	c.	Lest $f : R \to R$ defined by $f(x) = \begin{cases} 3x-5 & \text{for } x > 0 \\ -3x+1 & \text{for } x \le 0 \end{cases}$ Determine (i) f(0), f(t), f(5/3), f(-5/3) (ii) $f^{-1}(0)$, $f^{-1}(t)$, $f^{-1}(-1)$, $f^{-1}(3)$, $f^{-1}(-3)$, $f^{-1}(-6)$	7	L3	CO1
		Module – 2			
Q.3	a.	Write the converse, inverse and contrapositive of the conditional statement. "If the home team wins then it is raining".	6	L2	CO3
	b.	Define Tautology and prove that $[(p \vee q)] \wedge [(p \to q) \wedge (q \to r)] \to r$, is a tautology.	7	L2	CO3
	c.	Give a direct proof, an indirect proof and a proof by contradiction for the following statement "If n is an odd integer then n+9 is an even integer".	7	L2	CO3
		OR			
Q.4	a.	Prove the following is valid argument: $\neg p \to q$ $q \to r$ $\neg r$ $\therefore p$	6	L2	CO3
	b.	Using laws of logic prove the following : i) $[p \vee q] \vee [(\neg p \wedge \neg q \wedge r)] \equiv (p \vee q \vee r)$ ii) $(p \to q) \wedge [\neg q \wedge (r \wedge \neg q)] \equiv \neg(p \vee q)$	7	L2	CO3

	c.	Test the validity of the argument $\forall x, [p(x) \rightarrow q(x)]$ $\forall x, [q(x) \rightarrow r(x)]$ $\exists x, \neg r(x)$ $\therefore \exists x, \neg p(x)$	7	L2	CO3
		Module – 3			
Q.5	a.	If A = {1, 3, 5}, B = {2, 3}, C = {4, 6}, find the following : (i) $(A \times B) \cup (B \times C)$ (ii) $(A \cup B) \times C$ (iii) $(A \times B) \cap (B \times A)$	6	L2	CO5
	b.	Let A = {1, 2, 3, 4} and R = {(1, 1), (1, 2), (2, 1), (2, 2), (3, 4), (4, 3), (3, 3), (4,4) } be a relation on A. Verify that R is an equivalence relation.	7	L2	CO5
	c.	Let R be a relation on the set A = {1, 2, 3, 4} defined by xRy if and only if "x divides y". Prove that (A, R) is a poset. Draw its Hasse diagram.	7	L2	CO5
		OR			
Q.6	a.	Let A = {1, 2, 3, 4} and let R be the relation on A defined by xRy iff "x divided y" written x/y. i) Write down R as a set of ordered point ii) Draw the digraph of R iii) Determine the in-degree and out-degree of the vertices in the digraph.	6	L2	CO5
	b.	Let A = {1, 2, 3}, B = {1, 2, 3, 4}. The relation R and S from A to B are represented by the following matrices $M_R = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$ $M_R = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$ Determine the relations $\overline{R}$, $R \cup S$, $R \cap S$ and their matrix representations.	7	L2	CO5
	c.	Draw the Hasse diagram representation of the partial ordering {(a, b) | a divides b } on {1, 2, 3, 4, 6, 12}	7	L2	CO5
		Module – 4			
Q.7	a.	Find the value of k such that the following distribution represents a finite probability distribution. Hence find its mean, variance. Also find $p(x < 1)$, $p(x > 0)$, $p(-2 < x \leq 3)$ x: -3, -2, -1, 0, 1, 2, 3 p(x): k, 2k, 3k, 4k, 3k, 2k, k	6	L3	CO2
	b.	If 2% of fuses manufactured by a firm are defective, find the probability that a box containing 200 fuses has i) At least one defective fuse ii) Three or more defective fuses iii) Exactly two defective fuses.	7	L3	CO2
	c.	The probability that a patient recovers from a rare blood disease is 0.4. If 15 people are known to have contracted the disease. What is the probability that i) At least 10 survive ii) From 3 to 8 survive iii) Exactly 5 survive	7	L3	CO2
		OR			
Q.8	a.	A random variable x has the following probability density function $f(x) = \begin{cases} kx^2, & -3 \leq x \leq 3 \\ 0, & \text{otherwise} \end{cases}$ Evaluate k and find (i) $p(1 \leq x \leq 2)$ (ii) $p(x \leq 2)$ (iii) $p(x > 1)$	6	L3	CO2

	b.	The market of 1000 students in an examination follows normal distribution with mean 70 and standard deviation 5. Find the number of students whose marks will be (i) less than 65 (ii) More than 75 (iii) between 65 and 75. Given that $\phi(1) = 0.3413$	**7**	**L3**	**CO2**
	c.	A random variable X has the following probability density function for various values of x : x : 0 1 2 3 4 5 6 p(x) : k 3k 5k 7k 9k 11k 13k For what value of k does this represents a valid probability distribution? Find $p(x < 4)$, $p(x \geq 5)$, $p(3 \leq x \leq 6)$.	**7**	**L3**	**CO2**
		Module – 5			
Q.9	**a.**	Define the following with an example : i) Complete graph ii) Bipartite graph iii) Complement graph	**6**	**L2**	**CO4**
	b.	Show that the following graphs are Isomorphic. [Refer Fig.Q9(b)(i), Fig.Q9(b)(ii)]  Fig.Q9(b)(i)  Fig.Q9(b)(ii)	**7**	**L2**	**CO4**
	c.	Explain the Konigsberg bridge problem.	**7**	**L2**	**CO4**
		OR			
Q.10	**a.**	Define the terms : (i) Regular graph (ii) Planar graphs (iii) Hamilton path with suitable example for each.	**6**	**L2**	**CO4**
	b.	Show that the bipartite graph $K_{2,2}$ and $K_{2,3}$ are planar graphs. [Refer Fig.Q10b(i) and Fig.Q10b(ii)]  Fig.Q10(b)(i)  Fig.Q10(b)(ii)	**7**	**L2**	**CO4**
	c.	Find the chromatic polynomial and chromatic number for the cycle C_4 of length 4. [Refer Fig.Q10(c)]  Fig.Q10(c)	**7**	**L2**	**CO4**

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CBCS SCHEME

USN | | | | | | | | | | |

22MCA12

First Semester MCA Degree Examination, June/July 2023
Operating System Concepts

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define an Operating System. Explain the abstract view of the components of a computer system with a neat diagram.	10	L2	CO1
	b.	Describe the operating system operations with a neat diagram.	10	L2	CO1
		OR			
Q.2	a.	Explain the operating system services.	10	L2	CO1
	b.	Define a system call. Explain the types of system calls.	10	L2	CO1
		Module – 2			
Q.3	a.	Define a process. Explain the different states of a process with a neat diagram.	8	L2	CO2
	b.	Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. i) FCFS ii) SJF.	12	L3	CO2
		OR			
Q.4	a.	Define a thread. Explain the benefits of multithreading.	10	L2	CO2
	b.	Describe the different multithreading models.	10	L2	CO2
		Module – 3			
Q.5	a.	Define cooperating process. Discuss the critical section problem and also list the requirements to the solution of critical section problem.	10	L2	CO3
	b.	Define a semaphore. Explain the wait( ) and signal( ) operations. Outline the mutual – exclusion implementation with semaphores.	10	L2	CO3
		OR			
Q.6	a.	Consider the following snapshot of a system:	12	L3	CO3

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

Answer the following questions using the Banker's algorithm.

i) What is the content of matrix need?
ii) Is the system in a safe state? If yes, give the safe sequence.
iii) If a request from process P_1 arrives for (0, 4, 2, 0), can the request be granted immediately?

	b.	Explain the steps to recover from a deadlock with an example.	**8**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Write a C program to simulate paging technique of memory management.	**10**	**L3**	**CO4**
	b.	Explain the segmentation hardware with a neat diagram.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Explain the steps in handling a page fault with a neat diagram.	**10**	**L2**	**CO4**
	b.	Consider the following memory reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames. How many page faults will occur with respect to the following page replacement algorithms: i) FIFO page replacement ii) Optimal page replacement iii) LRU page replacement.	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Define a File. List all the attributes of a file.	**10**	**L2**	**CO5**
	b.	Discuss the different operations on a file.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain the following file-access methods i) Sequential access ii) Direct access.	**10**	**L2**	**CO5**
	b.	Describe the following schemes for defining the logical structure of a directory. i) Single-level directory ii) Two-level directory iii) Tree-structured directory.	**10**	**L2**	**CO5**

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CBCS SCHEME

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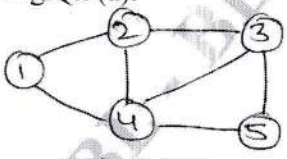
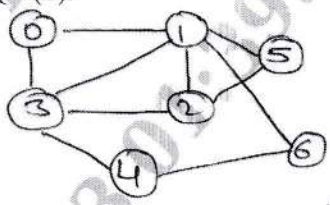
22MCA13

First Semester MCA Degree Examination, June/July 2023
Data Structures with Algorithms

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What are data structures? Explain the classification of data structures.	6	L2	CO1
	b.	Explain polish and reverse polish expression.	4	L2	CO1
	c.	Define STACK. Write C program to implement stack operation using arrays (by passing parameters).	10	L3	CO2
		OR			
Q.2	a.	Write a C program to convert infix to postfix expression.	10	L3	CO2
	b.	Show the detailed contents of stack for an expression : 623 + - 382 / + * 2 – 3 + and evaluate the expression.	10	L3	CO2
		Module – 2			
Q.3	a.	Write a recursive function fact(n) to find the factorial of an integer. Diagrammatically explain how the stacking and unstacking takes place during execution for fact(u).	10	L3	CO2
	b.	What is Queue? Write a function to demonstrate insert and delete operation in a linear queue.	10	L3	CO2
		OR			
Q.4	a.	What is recursion? Write a program to implement towers of Hanoi problem using recursion and trace the output for 3 disks.	10	L3	CO2
	b.	Define circular queue. Explain its advantages over ordinary queue and C program to implement circular queue.	10	L3	CO2
		Module – 3			
Q.5	a.	Discuss about different types of memory management functions.	10	L2	CO3
	b.	Write a function for each of the following operations on linked list: i) Insert a node at the beginning ii) Delete a node at the front end.	10	L3	CO3
		OR			
Q.6	a.	Write a note on getnode( ) and freenode( ).	6	L2	CO3
	b.	Discuss the limitations of array implementations.	4	L2	CO3
	c.	Explain linked implementation of stacks with push and pop operation using singly linked list.	10	L2	CO3

		Module – 4			
Q.7	**a.**	Define a Tree. With suitable example explain: i) Binary Tree ii) Complete binary tree iii) Strictly binary tree iv) Skewed binary tree	**10**	**L2**	**CO3**
	b.	Write the routines to traverse the given tree using i) Pre-order traversal ii) Post-order traversal iii) In-order traversal.	**10**	**L2**	**CO3**
		OR			
Q.8	**a.**	Construct a binary search tree for the given set of values 14, 15, 4, 9, 7, 18, 3, 5, 16, 20. Also perform inorder, preorder, and postorder traversal of the obtained tree.	**10**	**L3**	**CO3**
	b.	Explain threaded binary tree and their representation with a neat diagram.	**10**	**L2**	**CO3**
		Module – 5			
Q.9	**a.**	Define Graphs. Give the adjacency matrix and adjacency list representation for the following graph in Fig.Q.9(a).  Fig.Q.9(a)	**10**	**L3**	**CO3**
	b.	Briefly explain Breadth-First Search (BFS) and Depth-First Search (DFS) traversal of a graph. Also, show the BFS and DFS traversals for the following graph in Fig.Q.9(b).  Fig.Q.9(b)	**10**	**L3**	**CO3**
		OR			
Q.10	**a.**	Write an algorithm for insertion sort suppose an array contains 8 elements as follows: 77, 33, 44, 11, 88, 22, 66, 55. Sort the array using insertion sort algorithm.	**10**	**L3**	**CO4**
	b.	What is hashing? Explain the following hash functions with proper examples: i) Division ii) Midsquare iii) Folding.	**10**	**L3**	**CO4**

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CBCS SCHEME

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22MCA14

First Semester MCA Degree Examination, June/July 2023
Computer Networks

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Networks. Illustrate the categories of Networks with suitable diagrams.	10	L2	CO1
	b.	Interpret the functionalities of layers in the OSI Model.	10	L2	CO1
		OR			
Q.2	a.	Describe the functionalities of TCP/IP protocol suite.	10	L2	CO1
	b.	Classify the levels of addressing used in an internet employing TCP/IP protocols.	10	L2	CO1
		Module – 2			
Q.3	a.	Identify the causes of transmission impairment.	10	L2	CO2
	b.	Represent the parameters which affects the performance of a network.	10	L2	CO2
		OR			
Q.4	a.	Explain the line coding with respect to polar and bipolar scheme.	10	L2	CO2
	b.	Describe the role of Pulse Code Modulation (PCM) technique in digitization.	10	L2	CO2
		Module – 3			
Q.5	a.	Define Multiplexing. Classify the categories of multiplexing.	10	L2	CO3
	b.	Interpret spread spectrum with respect to frequency hopping and direct sequence.	10	L2	CO3
		OR			
Q.6	a.	Represent the role of datagram networks in data communication.	10	L2	CO3
	b.	Explain the functionalities of virtual circuit networks.	10	L2	CO3
		Module – 4			
Q.7	a.	Express the process of error detection and error correction in block coding.	10	L2	CO4
	b.	Explain the role of Hamming code in linear block code.	10	L2	CO4

		OR			
Q.8	**a.**	Describe the process of CRC encoder and decoder with suitable example.	10	L2	CO4
	b.	Discuss about checksum error detection with respect to one's complement and internet check sum.	10	L2	CO4
		Module – 5			
Q.9	**a.**	Discuss the design and algorithm of simplest protocol in noiseless channel.	10	L2	CO4
	b.	Represent the design and algorithm of stop and wait protocol in noiseless channel.	10	L2	CO4
		OR			
Q.10	**a.**	Explain about stop and wait automatic repeat request protocol algorithm in noisy channel.	10	L2	CO4
	b.	Discuss about go back N automatic repeat request protocol algorithm in noisy channel.	10	L2	CO4

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CBCS SCHEME

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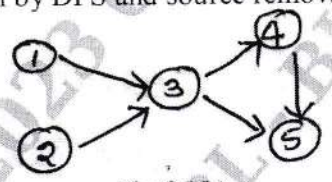
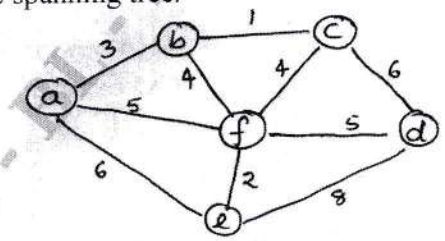
22MCA15

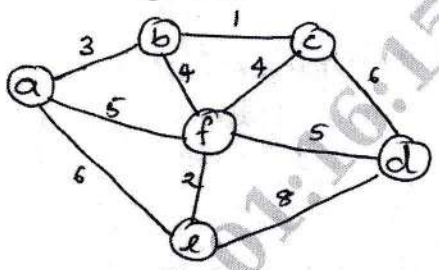
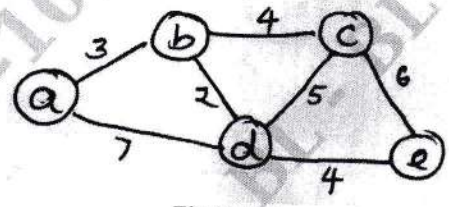
First Semester MCA Degree Examination, June/July 2023
Design and Analysis of Algorithm

Time: 3 hrs. Max. Marks: 100

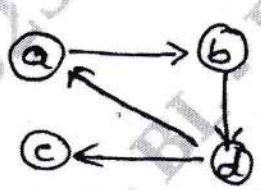
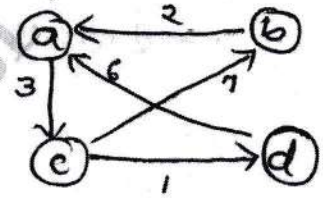
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

		Module – 1	M	L	C
Q.1	a.	List out important problem types. Explain any three of them.	10	L1	CO1
	b.	What is asymptotic notation? List and explain the asymptotic notation	10	L1	CO1
		OR			
Q.2	a.	List out the fundamental data structures. Explain any two of them.	10	L1	CO1
	b.	What is an algorithms? List the algorithm specifications and explain.	5	L1	CO1
	c.	Prove the following theorem. If $t_1(n) \in 0\ (g_1(n))$ and $t_2(n) \in 0(g_2(n))$ then $t_1(n) + t_2(n) \in 0\ (\max\{g_1(n), g_2(n)\}$	5	L2	CO2
		Module – 2			
Q.3	a.	Discuss Strassen's matrix multiplications and analyze. Also find the product of $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ Using Strassen's matrix multiplication.	12	L2	CO2
	b.	Write an algorithm for quick sort and analyze its efficiency.	8	L3	CO3
		OR			
Q.4	a.	Write algorithm for merge sort find the time complexity. Sort the following using merge sort. 8, 3, 2, 9, 7, 1, 5, 4.	10	L3	CO3
	b.	What do you mean by topological order of a graph? Find the topological order of the given graph by DFS and source removal method  Fig Q4(b)	10	L2	CO2
		Module – 3			
Q.5	a.	Write the Prims algorithm to find minimal spanning tree. And apply the Prims algorithm to find the minimal spanning tree for a given graph and find the cost of the spanning tree.  Fig Q5(a)	10	L3	CO3

	b.	Write the Kruskal's algorithm. Find the minimum spanning tree for the given graph using Kruskal's algorithm.  Fig Q5(b)	10	L3	CO3
		OR			
Q.6	a.	Write the Dijkstra's algorithm to find single source shortest path problem. Apply Dijkstr's algorithm considering 'a' as the source vertex to find single source shortest path.  Fig Q6(a)	10	L3	CO3
	b.	Define Huffman tree. Consider the five character alphabet with following probability. i) Construct Huffman tree ii) Construct the Huffman code for all characters iii) Encode DAD iv) Decode 1001101101110111	10	L3	CO3

Character	A	B	C	D	-
Probability	0.35	0.1	0.2	0.2	0.15

		Module – 4			
Q.7	a.	Write the Warshalls's algorithm and find the transitive closure for the given graph.  Fig Q7(a)	10	L2	CO2
	b.	Write the Floyd's algorithm and apply this algorithm to find all pair shortest path for the given diagraph.  Fig Q7(b)	10	L2	CO2

<table>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.8</td><td>a.</td><td>Discuss the knapsack problem by dynamic programming with respect to the following example.
<table>
<tr><th>Items</th><th>Weight</th><th>Value</th></tr>
<tr><td>1</td><td>2</td><td>12</td></tr>
<tr><td>2</td><td>1</td><td>10</td></tr>
<tr><td>3</td><td>3</td><td>20</td></tr>
<tr><td>4</td><td>2</td><td>15</td></tr>
</table>
Capacity W = 5</td><td>12</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>Discuss optional Binary search trees and write its algorithm.</td><td>8</td><td>L1</td><td>CO1</td></tr>
<tr><td colspan="6">Module – 5</td></tr>
<tr><td>Q.9</td><td>a.</td><td>Explain Backtracking. Describe the 4-Queen problem and discuss the possible solution.</td><td>10</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>b.</td><td>Explain P, NP and NP complete problem with example</td><td>10</td><td>L2</td><td>CO2</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.10</td><td>a.</td><td>Explain Brand and Bound technique solve the assignment problem using branch and bound technique.
$$\begin{array}{cccccc} \text{job}\rightarrow & 1 & 2 & 3 & 4 & \downarrow\text{person} \\ & 9 & 2 & 7 & 8 & a \\ & 6 & 4 & 3 & 7 & b \\ & 5 & 8 & 1 & 8 & c \\ & 7 & 6 & 9 & 4 & d \end{array}$$</td><td>10</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>What is state space tree? Draw the state space tree of the Back tracking algorithm applied to the instance S = {3, 5, 6, 7} and d = 15 of the sub set sum problem.</td><td>10</td><td>L2</td><td>CO2</td></tr>
</table>

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20-21-22 - IIsem. MCA

CBCS SCHEME

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22MCA21

Second Semester MCA Degree Examination, June/July 2023
Database Management System

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain the Database System Environment with neat diagram. **(10 Marks)**
b. Discuss the characteristics and advantages of Database Approaches. **(10 Marks)**

OR

2 a. Explain with proper diagram, the 3 – schema architecture of DBMS. **(10 Marks)**
b. What are the different types of attributes? Explain with example. **(10 Marks)**

Module-2

3 a. Explain Unary Operation SELECT (σ) and prove it is commutative. **(10 Marks)**
b. Explain Schema Update Operations, with a suitable examples. **(10 Marks)**

OR

4 a. With a suitable example, explain Join and division operation in relational algebra. **(10 Marks)**
b. Explain in detail ER – to – Relational Mapping algorithm. **(10 Marks)**

Module-3

5 a. Explain with suitable example the basic structure of SQL query. **(10 Marks)**
b. What are Views in SQL? Explain. **(10 Marks)**

OR

6 a. In SQL how to handle the Aggregate functions with group by and having clauses? With examples. **(06 Marks)**
b. What are Aggregate functions? Explain with an examples. **(06 Marks)**
c. Explain the architecture of JDBC main components and types of drivers. **(08 Marks)**

Module-4

7 a. Discuss informal design guidelines for relational schema. **(10 Marks)**
b. What is Normalization? What are its advantages? Discuss 1NF , 2NF and 3NF. **(10 Marks)**

OR

8 a. Explain with an example the Boyce – Codd Normal Form (BCNF). **(10 Marks)**
b. Discuss the different inference rules for functional dependencies. **(10 Marks)**

Module-5

9 a. Explain ACID properties of transaction in details. **(10 Marks)**
b. Discuss the characterizing schedules based on recoverability. **(10 Marks)**

OR

10 a. Discuss a Lock – based concurrency control issue in DBMS transaction processing. **(10 Marks)**
b. Describe Granularity of data items and Multiple Granularity locking. **(10 Marks)**

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22MCA22

Second Semester MCA Degree Examination, June/July 2023
Object Oriented Programming Using Java

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What is scope and life time of a variable? Discuss each with the help of a java program.	10	L2	CO1
	b.	With the help of a proper java code, explain type conversion and type casting.	10	L2	CO1
		OR			
Q.2	a.	Explain the working of for-each version of for loop using a java program.	10	L2	CO1
	b.	Write a java program which demonstrates constructor overloading and method overloading.	10	L3	CO2
		Module – 2			
Q.3	a.	What is inheritance? Write a java program that implements simple inheritance.	10	L3	CO4
	b.	What are the two different user of super keyword in java? Illustrate each with proper examples.	10	L2	CO4
		OR			
Q.4	a.	What is dynamic method dispatch? Explain how a superclass reference variable can refer to a subclass object with the help of a program.	10	L2	CO3
	b.	List out the conditions that are need to be followed while using while using abstract classes. Demonstrate the same by creating an abstract class and method.	10	L2	CO3
		Module – 3			
Q.5	a.	Define interface. Discuss the features of interface and explain them with the help of a java program that implements an interface.	10	L2	CO3
	b.	List out the differences between abstract class and interface.	10	L1	CO3
		OR			
Q.6	a.	What is package in Java? List and explain the system packages in java.	10	L2	CO1
	b.	If user wants to group all the similar type of classes and interfaces and keep them in a package and access them, how it can be done? Explain.	10	L3	CO1

		Module – 4			
Q.7	**a.**	What is the use of multiple catch statement in exception handling? Discuss with a Java program.	**10**	**L2**	**CO5**
	b.	Weather try block can be nested in Java? If yes, demonstrate with the help of a java program.	**10**	**L2**	**CO5**
		OR			
Q.8	**a.**	Write a java program which uses throws keyword for handling exception.	**10**	**L3**	**CO5**
	b.	How to create a custom exception class in java? Demonstrate using a java program.	**10**	**L3**	**CO5**
		Module – 5			
Q.9	**a.**	Write a Java applet program which handles keyboard event.	**10**	**L3**	**CO6**
	b.	Explain the methods involved in life cycle of an applet.	**10**	**L2**	**CO6**
		OR			
Q.10	**a.**	How JButton class is used in swings? Explain.	**10**	**L2**	**CO7**
	b.	Write a Java program to display a frame using JFrame class.	**10**	**L3**	**CO7**

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22MCA23

Second Semester MCA Degree Examination, June/July 2023

Software Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Describe software engineering code of ethicks and professional practices as defined by IEEE/ACM.	10	L2	CO1
	b.	Why the software engineering is important? List the reasons. Brief the essential attributes of good software.	10	L2	CO1
		OR			
Q.2	a.	Describe the waterfall and incremental software process models with suitable diagram.	10	L2	CO1
	b.	Discuss the principles of Agile methods.	05	L2	CO1
	c.	Explain the extreme programming release cycle.	05	L2	CO1
		Module – 2			
Q.3	a.	Explain the classification of non-functional requirement with neat sketch and example.	10	L1	CO2
	b.	Explain the notations used in writing the software requirement specifications.	10	L1	CO2
		OR			
Q.4	a.	Discuss the various difficulties that a software engineer faces during the eliciting and understanding requirements.	10	L1	CO2
	b.	Discuss the important activities of requirements engineering process with neat diagram.	10	L1	CO2
		Module – 3			
Q.5	a.	Explain the generalization and inheritance with examples.	10	L1	CO3
	b.	Discuss about navigation of class models with suitable diagram and examples.	10	L1	CO3
		OR			
Q.6	a.	What is N-array association? Illustrate the aggregation with associations and compositions with suitable examples.	10	L1	CO3
	b.	Explain the concept of reification and constraints with neat diagram and	10	L1	CO3

		Module – 4			
Q.7	**a.**	Explain system models with suitable example.	**10**	**L2**	**CO4**
	b.	With neat diagram, explain the working procedure of RUP with its advantages.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Define design pattern. Explain the essential elements of design patterns.	**10**	**L2**	**CO4**
	b.	Explain in detail about the implementation issues involved in software engineering.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Discuss "Test Driven Development" (TDD) with its process and list out its benefits.	**10**	**L4**	**CO5**
	b.	Explain software evolution process with neat diagram.	**10**	**L4**	**CO5**
		OR			
Q.10	**a.**	Describe the three main types of software maintenance. List of some difficulties and distinguishes between them.	**10**	**L4**	**CO5**
	b.	Explain why problems with support software might mean an organization has to replace legacy systems.	**10**	**L4**	**CO5**

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22MCA24

Second Semester MCA Degree Examination, June/July 2023
Web Technologies

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define HTTP. Explain the different phases of HTTP.	10	L2	CO6
	b.	Briefly explain the following: (i) URL (ii) MIME (iii) Web server (iv) Web browser	10	L2	CO6
		OR			
Q.2	a.	Discuss the basic structure of a HTML5 webpage.	04	L2	CO6
	b.	List and explain any three from elements in HTML5 with a suitable example.	06	L2	CO6
	c.	Explain the following tags with examples: (i) Heading tag (ii) Hypertext link tag (iii) Image tag (iv) Audio and video tags (v) Progress tag	10	L2	CO6
		Module – 2			
Q.3	a.	What is CSS? Describe the different levels of CSS style sheets and their precedence.	10	L2	CO2
	b.	Mention any five CSS selectors and explain their use with a suitable example.	10	L2	CO2
		OR			
Q.4	a.	What is an array in Javascript? Explain the various ways of creating arrays. Mention any five array methods and explain their use.	10	L2	CO2
	b.	Write a Javascript program that accepts a value 'n' as input from the user and display the first 'n' fibanocci numbers as output.	04	L2	CO2
	c.	Discuss the following Javascript methods: (i) alert( ) (ii) prompt( ) (iii) confirm ( )	06	L2	CO2
		Module – 3			
Q.5	a.	What is boot strap? What are the features of boot strap? Create a simple webpage using boot strap.	10	L3	CO4
	b.	Discuss on the following by using boot strap code snippet: (i) Table (ii) Image (iii) Button (iv) Progress bar	10	L3	CO4

		OR			
Q.6	**a.**	List out the various types of forms in boot strap. Explain their use with code snippet.	**10**	**L3**	**CO4**
	b.	Discuss briefly on the Grid system of boot strap.	**05**	**L3**	**CO4**
	c.	Explain boot strap progress bars with code snippet.	**05**	**L3**	**CO4**
		Module – 4			
Q.7	**a.**	What is jQuerry? What are the advantages of jQuerry? Explain the syntax of jQuerry script with a suitable example.	**10**	**L2**	**CO1**
	b.	Develop jQuerry programs to implement the following jQuerry effects: (i) Show( ) and hide ( ) (ii) fadeIn( ) and fadeout( )	**10**	**L2**	**CO1**
		OR			
Q.8	**a.**	What is jQuery HTML? What are the methods used for DOM manipulation? Develop a jQuery program to get attribute values.	**10**	**L2**	**CO1**
	b.	What is an event? List the common events found in jQuery. Develop a jQuery program to implement mouse enter( ) jQuery event.	**10**	**L2**	**CO1**
		Module – 5			
Q.9	**a.**	What is Angular JS? Explain the following Angular JS directives: (i) ng_app (ii) ng_model (iii) ng_bind	**08**	**L2**	**CO5**
	b.	Write an Angular JS program to use expressions.	**06**	**L2**	**CO5**
	c.	Briefly discuss the use of filter in Angular JS with an example.	**06**	**L2**	**CO5**
		OR			
Q.10	**a.**	What is a Angular JS Service? Explain any three of them by using code snippet.	**10**	**L2**	**CO5**
	b.	Write an Angular JS program to demonstrate client-side form validation.	**10**	**L2**	**CO5**

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22MCA253

Second Semester MCA Degree Examination, June/July 2023
Enterprise Resource Planning (ERP)

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain in detail the four process cycles in a cycle view.	10	L2	CO1
	b.	Discuss in detail about the obstacles in achieving strategic fit.	10	L2	CO1
		OR			
Q.2	a.	Explain with suitable diagram the decision making framework.	10	L2	CO1
	b.	What are the factors to be considered during the selection of supplier? Explain.	10	L2	CO1
		Module – 2			
Q.3	a.	Explain the ERP implementation strategies in detail.	10	L2	CO2
	b.	Discuss in detail the hidden cost involved in ERP implementation.	10	L2	CO2
		OR			
Q.4	a.	Explain about the nine knowledge areas in PM BOK.	10	L2	CO2
	b.	What are the golden rules of successful project implementation?	10	L2	CO2
		Module – 3			
Q.5	a.	Explain finance module in detail and its advantages.	10	L2	CO3
	b.	Discuss in detail about sales and distribution module.	10	L2	CO3
		OR			
Q.6	a.	Write in detail about manufacturing module.	10	L2	CO3
	b.	In detail discuss about quality management module.	10	L2	CO3
		Module – 4			
Q.7	a.	Explain SAP-AG vender information in detail.	10	L2	CO4
	b.	Write in detail about oracle corporation.	10	L2	CO4
		OR			
Q.8	a.	Write in detail about Baan company.	10	L2	CO4
	b.	Discuss in detail about Indian ERP market.	10	L2	CO4

		Module – 5			
Q.9	**a.**	Explain in detail the turbo charge of ERP system.	**10**	**L2**	**CO5**
	b.	What are the future directions of ERP?	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Write in detail about ERP and E-commerce.	**10**	**L2**	**CO5**
	b.	Discuss in detail about enterprise application pitfalls.	**10**	**L2**	**CO5**

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22MCA262

Second Semester MCA Degree Examination, June/July 2023
Artificial Intelligence

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What is artificial intelligence and list the task domains of artificial intelligence.	10	L1	CO1
	b.	State and explain algorithm for best first search algorithm with example.	10	L2	CO1
		OR			
Q.2	a.	A water Jug problem : you are given two jugs, a 4 gallon one and a 3-gallon one, a pump which has unlimited water which you can use to fill the jug, and the ground on which water may be poured. Neither jug has any measuring markings on it. How can you get exactly 2 gallons of water in the 4 gallon jug? i) Write down the production rules for the above problem ii) Write one solution to be above problem.	10	L3	CO1
	b.	Elaborate the steps of solving travelling salesman problem.	10	L3	CO1
		Module – 2			
Q.3	a.	Describe the issues of knowledge representation.	10	L2	CO2
	b.	Consider the following set of well formed formulas in predicate logic i) Man(marcus) ii) Pompeian (marcus) iii) $\forall X$: Pompeian(X) $\rightarrow$Roman(X) $\rightarrow$ iv) ruler (Caesar) v) $\forall X$: Roman(X) $\rightarrow$ loyalto(X·Caesar) V hate (X, Caesar) vi) $\forall X : \rightarrow Y$: loyalto(x,y) vii) $\forall X : \forall Y$: man (x) $\wedge$ ruler(Y) $\wedge$ tryassassinate (x, y) $\rightarrow$ loyal to (x, y) viii) Tryassassinate (marcus, Caesar) Convert these into clause form and prove that hate(marcus, Caesar) using resolution proof.	10	L3	CO2
		OR			
Q.4	a.	Elaborate the four properties for representation of knowledge in a good system.	8	L2	CO2
	b.	Write in brief inheritable knowledge with example.	8	L2	CO2
	c.	List the issues in knowledge representation.	4	L1	CO2

Module – 3

Q.5	a.	Illustrate Bayes theorem and maximum posterior hypothesis.	6	L2	CO3
	b.	The following dataset gives information about stolen vehicles using Naïve Bayes classifier classify the new data (Red, SUV, Domestic)	8	L3	CO3
	c.	Outline Brute force MAP Learning algorithm.	6	L1	CO3

Color	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Imported	Yes
Red	Suv	Imported	No
Yellow	Sports	Domestic	No
Yellow	Suv	Imported	Yes
Yellow	Sports	Domestic	Yes
Red	Suv	Imported	No

OR

Q.6	a.	Elaborate inference. Write various inference strategies.	10	L2	CO3
	b.	Illustrate the following : i) Probability ii) Conditional probability iii) Certain factor iv) Baye's theorem v) Baye'sian network.	10	L2	CO3

Module – 4

Q.7	a.	Justify planning. Write various components of planning.	8	L2	CO4
	b.	Elaborate STRIP mechanism. Explain all list used in STRIP operating.	8	L2	CO4
	c.	Write two important features of planning.	4	L2	CO4

OR

Q.8	a.	In brief explain general learning system.	10	L2	CO4
	b.	Illustrate the following : i) Machine learning ii) Adaptive learning.	10	L2	CO4

Module – 5

Q.9	a.	Elaborate the expert system role and knowledge acquisition.	5	L2	CO5
	b.	Briefly write a note on explanation based learning and explain rote learning with an example.	10	L2	CO5
	c.	Short note on the concept of learning from taking advice.	5	L2	CO5

OR

Q.10	a.	Define the following : i) MYCIN ii) DART.	10	L2	CO5
	b.	Brief the limitations and benefits of expert systems.	10	L2	CO5

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20MCA22

Second Semester MCA Degree Examination, June/July 2023
Object Oriented Programming with Java

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Discuss the various primitive data types available in java with suitable examples. **(10 Marks)**

b. Write a Java program to perform multiplication of two matrix using two dimensional array. **(10 Marks)**

OR

2 a. Discuss any five methods of StringBuffer class with appropriate examples. **(10 Marks)**

b. Explain Else-if ladder and switch statement with its syntax and example. **(10 Marks)**

Module-2

3 a. Explain variable-length arguments in Java with its syntax and example program. **(10 Marks)**

b. Illustrate static variable, static method and static block in java with an example. **(10 Marks)**

OR

4 a. Describe abstract class and abstract method in java with its syntax and example. **(10 Marks)**

b. Explain dynamic method dispatch in java with an example program. **(10 Marks)**

Module-3

5 a. Describe how an interface extends one or more interfaces with a suitable example. **(10 Marks)**

b. Write the following java program to create package and import it in other program :

i) Create package called shape

ii) Define a class called Triangle.java in shape package. Triangle. java should calculate the area of triangle.

iii) Compile and import shape Triangle in another class TestPackage.java (TestPackage.java class should be in another package test). **(10 Marks)**

OR

6 a. Illustrate the use of throw and throws keywords in java with examples. **(10 Marks)**

b. Construct a java program to implement a queue using user defined exception handling. **(10 Marks)**

Module-4

7 a. Define multithreading. Explain the mechanism of creating thread using runnable interface with an example. **(10 Marks)**

b. Construct a Java program to create an enumeration day of week with seven values SUNDAY through SATURADY and add a method is workday( ) to the Dayofweek class that returns true if the value on which it is called is Monday through FRIDAY. For example, the call Dayofweek.SUNDAY.isWORKDay( ) returns false. **(10 Marks)**

OR

8 a. Write a Java program to implement interthread communication. **(10 Marks)**

b. Illustrate autoboxing and auto unboxing in arithmetic expressions with an example. **(10 Marks)**

Module-5

9 a. Write short notes on the following classes :
   - i) InetAddress
   - ii) Socket
   - iii) URL
   - iv) HttpURLConnection. **(10 Marks)**

b. What are collections? Write a program to demonstrate Linkedlist class. **(10 Marks)**

OR

10 a. Write a java program which uses datagram socket to demonstrate client server communication. **(10 Marks)**

b. Define genericlass. Write a simple Java program to show working of user defined Generic classes. **(10 Marks)**

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20MCA24

Second Semester MCA Degree Examination, June/July 2023
Software Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Compare between Generic Products and Customized Products. **(02 Marks)**

b. Explain IEEE standards of software engineering code of ethics and professional practice. **(08 Marks)**

c. With a neat diagram, explain waterfall model. Discuss advantages and disadvantages of the same. **(10 Marks)**

OR

2 a. Explain the principles of Agile method. **(05 Marks)**

b. Differentiate between plan driven and agile method. **(05 Marks)**

c. With a neat diagram, explain the scrum process. Discuss the advantages of the same. **(10 Marks)**

Module-2

3 a. Explain non-functional requirements along with a neat diagram. **(10 Marks)**

b. Explain the structure of software requirement document. **(10 Marks)**

OR

4 a. With a neat diagram, explain requirement elicitation and analysis. **(10 Marks)**

b. Explain ethnography with a diagram. **(10 Marks)**

Module-3

5 a. Explain object oriented themes. **(06 Marks)**

b. Explain the purposes served by models. **(04 Marks)**

c. Define Association. Explain the elements that can be associated [shown] at the end of an association. **(10 Marks)**

OR

6 a. Differentiate between association, aggregation and composition. **(10 Marks)**

b. What is multiple inheritance? Explain the situations when we come across multiple inheritance. **(10 Marks)**

Module-4

7 a. Explain state diagram behaviour in detail. **(10 Marks)**

b. Explain the components of activity model. **(10 Marks)**

OR

8 a. Along with a diagram, explain different types of concurrency. **(10 Marks)**

b. Explain different use case relationships. **(10 Marks)**

Module-5

9 a. Explain briefly top-down estimation and bottom-up approach in estimation. **(10 Marks)**

b. What is coupling? Explain different types of coupling. **(10 Marks)**

OR

10 a. Define Risk. Explain top five risks and techniques to manage those risks. **(10 Marks)**

20. IIIsem M.CA

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20MCA31

Third Semester MCA Degree Examination, June/July 2023
Data Analytics Using Python

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Write the equivalent python expression for the following :

i) $\dfrac{x^{5/2} - g(mg + h)}{x + \dfrac{y}{ab}}$ ii) $\sqrt[n]{\log_e x + \text{Sin}\,\theta}$

iii) $\beta x^2 + \text{Sec}\,x + x\,\text{Sin}^2 x$ iv) $3.8269 * 10^2 \left[\dfrac{g+n}{a-b}\right]$

v) a is greater than any one of x, y, z. **(05 Marks)**

b. Explain the precedence and associativity with respect to arithmetic operators. Give examples. **(06 Marks)**

c. Explain range( ) function. Using for loop with range( ) function, write a program to evaluate and tabulate $f(x) = \sqrt{x^2 + 2x - 1}$ for all x varying from -1.0 to 1.0 in steps of 0.2. **(09 Marks)**

OR

2 a. Evaluate the following expression

i) 4 * 5% 2 * 3 ii) 2 ** 3 ** 2 iii) 8* (2+4) // 5*2 + 3% 5 * 2 iv) 3 * 2 ** 4 * 2

v) 10 > 15 OR NOT 5 = = 10 AND 5! = 5. **(05 Marks)**

b. Explain: i) While loop ii) break statement iii) Continue statement. Give suitable examples. **(07 Marks)**

c. Square of 12 is 144 and reverse of 12 is 21
Square of 21 is 441 which is reverse of 144
Write a program to point all such pair of number from 11 to 99. **(08 Marks)**

Module-2

3 a. Explain indexing and slicing in strings. Discuss negative index also. Give examples. **(06 Marks)**

b. Assume a list 'x' containing some elements. Perform the following operation on 'x' without using any built in function or method.

i) insert 7 as the first element
ii) insert 7 as the last element
iii) remove the first element
iv) remove the last element
v) insert 7 into the index position 2
vi) remove the element in index position 3
vii) reverse the sequence of elements in x
viii) remove all the elements. **(08 Marks)**

c. Explain the storage structure dictionary and the methods items( ), update( ). **(06 Marks)**

OR

4 a. Compare the storage structures strings, tuple, list sets and dictionaries. **(08 Marks)**

b. Explain how a class is declared in python with examples. **(04 Marks)**

c. Define a class 'circle' with data members radius constructor to read radius, method to compute the area and overloaded function to point radius and area, Inherit 'circle' class into another class 'Cylinder' with data member height, method to compute volume and overloaded function to print radius, length and volume. Inheritance should be carried in all the stages of instantiation, computation and point. Write a main program use the class cylinder. **(08 Marks)**

Module-3

5 a. Why NumPy is used? List and explain NumPy array attributes. With a diagram differentiate between NumPy Array and Python Lists. **(10 Marks)**

b. Explain the following Padas summarizing and descriptive statistics function with suitable examples. i) df.head( ) ii) df.cumsum( ) iii) df.sum iv) df.descrite( ) v) df.idmax( ) **(10 Marks)**

OR

6 a. Explain the following NumPy function with suitable examples :
i) np.ones( ) ii) np.full( ) iii) np.arangeo iv) np.eye( ) v) np.linspace( ) **(10 Marks)**

b. What is the use of Pandas library? Explain series and DataFrame data structures. Write code block to create a series with 10 random values ranging from 1 to 40 and store only the values greater than 20 into another series. **(10 Marks)**

Module-4

7 a. Explain the categories of optimal arguments in Pandas CSV read function. Write a python program to read a CSV file and load into a DataFrame and also write the contents of the DataFrame to a CSV file by selecting only chosen columns from the DataFrame. **(10 Marks)**

b. Write a python program to python the following operations :
i) Connect to a database
ii) Execute a simple select query
iii) Load the returned data into a DataFrame
iv) Display the dataframe contents
v) Insert a row into the database table. **(10 Marks)**

OR

8 a. Write a python program to perform the following operations.
i) Read two CSV files and load it into a DataFrame
ii) Concatenate the two CSV files contents stored in DataFrame
iii) Drop 'na' values
iv) Change column names
v) Fill missing values using fillna( ) **(10 Marks)**

b. Explain the following data transformation functions
i) duplicated ( ) ii) drop – duplicates( ) iii) map( ) iv) replace( ) v) isnull( ). **(10 Marks)**

Module-5

9 a. Write a python program to plot a simple Sinusoidal and cosine waves using Matplotlib. Using appropriate instruction apply line color as blue and line style as dotted for sine wave, set line floor as green for Cosine wave and fix the 'x' and 'y' axis range along with plot labels and legend. **(10 Marks)**

b. Write a python program to plot a histogram of the data of percentage secured by students. Customize the following settings :
  i) Chang to gray background
  ii) Draw a solid white line grid **(10 Marks)**

OR

10 a. What is the purpose of Matplotlib library? Explain the various types of plot that can be drawn using Matplotlib along with the name of respective plot function. **(10 Marks)**

b. List the shortcomings of Matplotlib and advantages of seaborn over Matplotlib. Write code block to plot normal distributed data using Seaborn kdeplot( ) (Kernel density estimation). **(10 Marks)**

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20MCA32

Third Semester MCA Degree Examination, June/July 2023
Internet of Things

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define IOT. Explain Evolutionary phases of Internet. **(10 Marks)**
b. Explain one M2M IOT standardized architecture with a neat diagram. **(10 Marks)**

OR

2 a. With a neat diagram, explain a simplified IOT architecture. **(10 Marks)**
b. Illustrate the challenges of IOT and their impact, with any 1 example. **(10 Marks)**

Module-2

3 a. Discuss and explain different types of sensors. **(12 Marks)**
b. Define smart objects. Explain its characteristic. **(08 Marks)**

OR

4 a. What is Zigbee? Explain 802.15.4 physical layer, MAC layer and security. **(10 Marks)**
b. Define Wireless Sensor Network (WSNs). Discuss the limitations of the smart object in WSNs. **(05 Marks)**
c. With a neat diagram, explain data aggregation in wireless sensor network. **(05 Marks)**

Module-3

5 a. List and explain the key advantage of internet protocol. **(10 Marks)**
b. What is COAP? Draw COAP message format? Explain its field. **(10 Marks)**

OR

6 a. With a neat diagram, explain 6 LOWPAN protocol header compression and fragmentation. **(10 Marks)**
b. Describe MQTT framework and message format in detect. **(10 Marks)**

Module-4

7 a. Discuss Bigdata analytics tools and technology. **(10 Marks)**
b. Explain neural network in machine learning with a detailed example. **(10 Marks)**

OR

8 a. Describe the components of flexible Net Flow Architecture (FNF). **(10 Marks)**
b. Discuss some of the common challenges in OT security. **(10 Marks)**

Module-5

9 a. Write a python program on Raspberry Pi to blink an LED. **(08 Marks)**
b. Explain Arduino uno micro controller. List technical specification of Arduino uno. **(06 Marks)**
c. Explain the interfaces of Raspberry P_i. **(06 Marks)**

OR

10 a. Explain the following with respect to Arduino programming:
i) Structure ii) Functions iii) Variables iv) Flow control statements v) Digital I/O vi) Constants. **(12 Marks)**
b. Explain in detail about smart city IOT architecture. **(08 Marks)**

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20MCA342

Third Semester MCA Degree Examination, June/July 2023
Cloud Computing

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define cloud computing? Discuss its key characteristics. **(06 Marks)**
b. Discuss the evolution of cloud computing. **(06 Marks)**
c. Narrate the technologies that have played an important role in realizing cloud computing today. **(08 Marks)**

OR

2 a. Describe various cloud benefits. **(06 Marks)**
b. Summarize the closer look of cloud. **(06 Marks)**
c. Discuss distributed systems and service oriented computing. **(08 Marks)**

Module-2

3 a. Differentiate between Parallel computing and Distributed Computing. **(06 Marks)**
b. Write a note on Peer-to-Peer architectural style. **(06 Marks)**
c. Describe various technologies of distributed computing. **(08 Marks)**

OR

4 a. Discuss any 3 software architectural styles of Distributed Computing. **(06 Marks)**
b. Write a note on Client –Server architectural style. **(06 Marks)**
c. Elaborate on the layered view of a distributed system. **(08 Marks)**

Module-3

5 a. Discuss pros and cons of virtualization in the context of cloud computing. **(06 Marks)**
b. Describe any 2 different hardware virtualization techniques. **(06 Marks)**
c. With a neat diagram, explain VMWare cloud solution stack with respect to virtualization used. **(08 Marks)**

OR

6 a. Explain the characteristics and benefits of virtualized environment. **(06 Marks)**
b. Differentiate between Type-I and Type-II hypervisors. **(06 Marks)**
c. Explain how XEN is different from other virtualization platforms. Explain its elements for virtualization. **(08 Marks)**

Module-4

7 a. Discuss IaaS reference model and functionalities of its components. **(06 Marks)**
b. Discuss the open challenges in Cloud Computing. **(06 Marks)**
c. Explain Cloud Computing architecture in detail. **(08 Marks)**

OR

8 a. Discuss on the economics of cloud. **(06 Marks)**
b. Discuss PaaS reference model along with different classifications of PaaS offerings. **(06 Marks)**
c. Briefly explain different types of clouds. **(08 Marks)**

Module-5

9 a. Explain how PaaS solutions are offered by Aneka cloud. **(06 Marks)**
b. Discuss how healthcare applications are delivered through cloud through an example. **(06 Marks)**
c. Write notes on EC2 and S3 of AWS. **(08 Marks)**

OR

10 a. Discuss components of open stack. **(06 Marks)**
b. Describe GAE architecture. **(06 Marks)**
c. Explain any 2 applications of cloud. **(08 Marks)**

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20. IV Sem MCA

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20MCA41

Fourth Semester MCA Degree Examination, June/July 2023
Advances in Web Technologies

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain any six string functions in PHP. **(06 Marks)**
b. Explain Cookies in PHP. **(04 Marks)**
c. Construct a PHP program to read student data from an XML file and store it into MYSQL. Retrieve and display the details using search options. **(10 Marks)**

OR

2 a. Explain Logical internal structure of arrays in PHP. **(06 Marks)**
b. Illustrate Session Tracking in PHP. **(04 Marks)**
c. Build a PHP form to display text base , table , radio button , submit button and clear button using XML. **(10 Marks)**

Module-2

3 a. List and explain different string methods in Ruby. **(10 Marks)**
b. Develop a program for generating dynamic documents in Ruby on Rails. **(10 Marks)**

OR

4 a. Demonstrate layouts in Rails. **(08 Marks)**
b. Develop a program in Ruby to read list of names from the keyboard, convert them all to upper case letters and place in an array and display in a sorted format. **(12 Marks)**

Module-3

5 a. Discuss the difference between Traditional web application and Ajax model. **(06 Marks)**
b. Describe the different HTTP status code with their message. **(04 Marks)**
c. Build a program to send the data to the server using GET method in Ajax. **(10 Marks)**

OR

6 a. Explain the technology behind Ajax. **(05 Marks)**
b. Create a program to send data to the server using POST method in Ajax. **(10 Marks)**
c. Explain the principles of Ajax. **(05 Marks)**

Module-4

7 a. Create a web page using array of XMLHTTP request object. **(08 Marks)**
b. Build a program to cancel pending request using fallback pattern. **(08 Marks)**
c. Describe Predictive fetch pattern. **(04 Marks)**

OR

8 a. Create a program for New comment Notifier using periodic refresh. **(08 Marks)**
b. Describe Periodic refresh pattern. **(04 Marks)**
c. Build a program for Page preloading using predictive fetch. **(08 Marks)**

40

Module-5

9	a.	Explain Fluid Grid system, with an example.	(05 Marks)
	b.	Create a table using bootstrap table classes.	(10 Marks)
	c.	Explain Responsive design with example.	(05 Marks)

OR

10	a.	Create a form using Optional form layouts of Bootstrap.	(10 Marks)
	b.	Explain Prepended appended Input controls with example.	(10 Marks)

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20MCA42

Fourth Semester MCA Degree Examination, June/July 2023
Programming using C#

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With neat diagram, explain the work flow that takes place between .NET Source code, .NET Compiler and the execution engine. **(10 Marks)**

b. Discuss between managed code and unmanaged code. **(06 Marks)**

c. Explain the role of Common Type System. **(04 Marks)**

OR

2 a. What are namespaces? List and explain the purpose of any three namespaces. **(10 Marks)**

b. Write short notes on:
(i) JIT compiler
(ii) Windows Communication Foundation **(10 Marks)**

Module-2

3 a. Explain how to create an array of objects of the class with the help of a C# program. **(10 Marks)**

b. Explain the concept of static methods and static data members with suitable examples. **(10 Marks)**

OR

4 a. Write a C# program to explain accessor and mutator properties used in encapsulation. **(10 Marks)**

b. Explain the following with example:
(i) Abstract class and abstract methods
(ii) Compile time and runtime polymorphism **(10 Marks)**

Module-3

5 a. What are delegates? Explain the concept of multicast delegate with an example. **(10 Marks)**

b. Write a C# program to calculate square of numbers using delegates. **(10 Marks)**

OR

6 a. Write a C# program using try, catch, finally to explain any predefined exceptions. **(10 Marks)**

b. Explain the properties and methods of Data Reader and Data Adapter Class. **(10 Marks)**

Module-4

7 a. Explain various keyboard events in C# windows applications. **(10 Marks)**

b. Discuss the architecture of WPF with a neat diagram. **(10 Marks)**

OR

8 a. Explain the following:
(i) XAML definition and elements
(ii) WPF Core Types **(10 Marks)**

b. What is GUI? List and explain basic controls of GUI. **(10 Marks)**

Module-5

9 a. Explain the architecture of a three tier web based application with a neat diagram. **(10 Marks)**

b. Write steps in session tracking with http session state using cookies. **(10 Marks)**

OR

10 a. Explain the controls from AJAX control toolkit. **(10 Marks)**

b. Explain different validation controls with suitable example supported by ASP.NET. **(10 Marks)**

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