ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA
Stream: CSE
PAPER TITLE: Design and Analysis of Algorithm
Maximum Marks: 40
Total No of questions: 08

Semester: II
PAPER CODE: ECS51102
Time duration: 3 hours
Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups

Group A

Answer all the questions of the following $\mathbf{5 \times 1 = 5}$

1. **a)** Given two sorted lists of size 'm' and 'n' respectively. How many comparisons are needed in worst case by merge sort algorithm?

b) The running time of an algorithm is given by:

$$T(n) = c + T(n-1), if\ n > 1, and\ T(1) = 1$$

Find out the asymptotic notation of the algorithm?

c) What is the maximum degree of the asymptotic notation obtained from Q. No. 1. b)

d) Which data structure is used for performing Quick Sort algorithm?

e) What kind of solution Dynamic Programming approach provide.

GROUP –B

(Short Answer Type Questions)

Answer *any three* of the following $\mathbf{3 \times 5 = 15}$

2. a) Let us assume that $w_i = [5,10,15,20,25]$ and W=30. What are the different combinations possible from the listed numbers to find total of 30? Use backtracking approach to solve the problem. [3]

b) Which data structure is used in Backtracking approach and why? [2]

3. a) Find the feasible solution (sequence of jobs) for the following list (Table – 1) of jobs. Also find the total profit earned. Assume that each job needs one unit of time in a single machine.[3]

Table – 1

Job No.	I	II	III	IV	V
Profit	50	30	10	20	15
Deadline	2	1	3	2	4

b) Is linear searching a greedy method. Justify. [2]

4. a) BFS and DFS are two graph traversing algorithms. What are the data structures required for each them? Justify the application using examples. [3]

b) State important differences between Dynamic Programming and Divide and Conquer approaches. [2]

5. a) Consider the following graph (Fig – 1). Starting from vertex 1 find the optimal tour so that a person may come back to source of journey visiting all the vertices. [5]

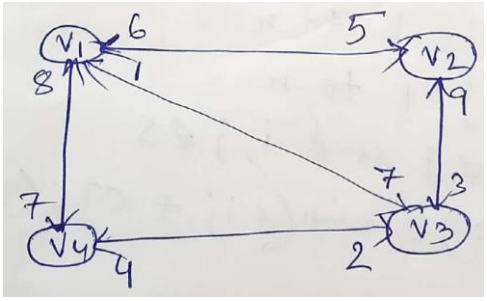

Fig – 1

GROUP –C
(Long Answer Type Questions)
Answer *any two* of the following **$2 \times 10 = 20$**

6. a) Discuss the following questions using the algorithm for adding two n by n matrices.

1. What is basic operation?
2. How many times it is performed as a function of the matrix order n?
3. How many times it is performed as a function of the total number of elements in the input matrices? [6]

b) State differences between Dynamic Programming and Greedy Approach using a brief example. [4]

7. a) Write the Asymptotic Notations used for best, average, and worst case analysis of algorithm. [2]

b) Write an algorithm to find the maximum element in an array of integers. Analyze best, average, and worst case of the algorithm. [8]

8. a) Consider the following sequence:

A: 1 3 7 1 2 4 3

B: 243

Use modulo arithmetic 13 and the Rabin-Karp algorithm to solve the given sequence. [4]

b) Apply the KMP algorithm for matching the following strings and illustrate the intermediate steps:

i. *A:* EXAMPLE *B: AMP*

ii. *A:* ACGTCCAT *B:* TCCA [4]

c) Write four application of string processing algorithm. [2]

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END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA
Stream: CSE
Semester: II

PAPER TITLE: Object Oriented Programming
PAPER CODE: ECS51104

Maximum Marks: 40
Time duration: 3 hours

Total No of questions: 08
Total No of Pages: 02

Instruction for the Candidate:

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Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. a) Define Collection framework in Java.
b) What is parameterized constructor?
c) What is the significance of abstract class?
d) Write the syntax of setPriority() method used in Java Thread handling.
e) What is the conditional operator used for?

GROUP –B
(Short Answer Type Questions)

Answer *any three* of the following $3 \times 5 = 15$

2. A school has following rules for grading system:
a. Below 25 – F
b. 25 to 45 – E
c. 45 to 50 – D
d. 50 to 60 – C
e. 60 to 80 – B
f. Above 80 – A
Write a Java program to enter marks and print the corresponding grade. 5

3. a) Write a Java program to create a Thread by extending Thread class.
b) What is the difference between String and StringBuffer classes? 4+1

4. a) Write a Java program to print the circumference and area of a circle of radius entered by user by defining your own method.
b) How will you create a Frame for a GUI-based application in Java. Mention the syntax. 3+2

5. Write short notes on exception handling in Java. 5

GROUP –C
(Long Answer Type Questions)

Answer *any two* of the following $2 \times 10 = 20$

6. a) What are the different stages in a JDBC program? Explain.

b) Differentiate between abstraction and encapsulation. Mention four points of difference between them. 6+4

7. a) Draw the Java AWT hierarchy figure.
b) What is super class in Java?
c) Write a Java program to illustrate single inheritance. 3+2+5

8. a) Write a Java program to print the names of students by creating a Student class. If no name is passed while creating an object of Student class, then name should be "Unknown", otherwise the name should be equal to the String value passed while creating object of Student class.
b) What is the difference between object-based programming languages and object-oriented programming languages? Mention examples for each. 5+(3+1+1)

ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA
Stream: CSE
Course Name: Operating System
Maximum Marks: 40
Total No of questions: 08

Semester: II
Course Code: ECS51106
Time duration: 3 Hours
Total No of Pages: 02

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Instruction to the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
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Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. **a)** What is Pull migration? Explain with example?
b) What is Push migration. Explain with example?
c) What is context switching?
d) A system has 3 processes sharing 4 resources. If each process needs a maximum of three units, then will the system go into Dead Lock? Justify your answer?
e) What is Multitasking System? Given an example?

GROUP –B
(Short Answer Type Questions)

Answer *any three* of the following $3 \times 5 = 15$

2. What is Process? Describe different stages of Process State diagram? 1+4=5

3. Explain Deadlock Avoidance mechanisms? What is starvation of a process? 4+1=5

Process	Burst Time (mills.)	Priority	Arrival Time (mills)
P1	9	5	0
P2	4	3	1
P3	5	1	2
P4	7	2	3
P5	3	4	4

a. Suppose a system uses Priority Queue scheduling algorithm. Create a Gantt chart illustrating the execution of these processes?

b. What is the turnaround time for process p3?

c. What is the average wait time for the processes? 3+1+1=5

4. Explain Reader-Writer Problem? 5

5. Explain Dining Philosopher's Problem? 5

GROUP –C
(**Long Answer Type Questions**)

Answer *any two* of the following $2 \times 10 = 20$

6. Explain Producer Consumer Problem? Explain Bounded Buffer Problem? 5+5=10

7. a) A system uses 3 page frames for storing process pages in main memory. It uses the Least Recently Used (LRU) page replacement policy. Assume that all the page frames are initially empty. What is the total number of page faults that will occur while processing the page reference string given below-

4 , 7, 6, 1, 7, 6, 1, 2, 7, 2

Also calculate the hit ratio and miss ratio.

b) A shared variable x, initialized to zero, is operated on by four concurrent processes W, X, Y, Z as follows. Each of the processes W and X reads x from memory, increments by one, stores it to memory, and then terminates. Each of the processes Y and Z reads x from memory, decrements by two, stores it to memory, and then terminates. Each process before reading x invokes the P operation (i.e., wait) on a counting semaphore S and invokes the V operation (i.e., signal) on the semaphore S after storing x to memory. Semaphore S is initialized to two. What is the maximum possible value of x after all process's complete execution?

c) Explain the techniques used to recover from deadlocks? 4+3+3=10

8. Consider the following snapshot of a system:

Process	Max			Allocation			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	7	5	3	0	1	0	3	3	4
P2	3	2	2	2	0	0			
P3	9	0	2	3	0	2			
P4	2	2	2	2	1	1			

Answer the following questions using the banker's algorithm:

a. What is the content of the matrix Need?

b. Is the system in a safe state. Give justification to your answer?

c. If a request from process P1 arrives for (0,3,1) additional allocation, can the request be granted immediately?

4+3+3=10

ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA
Semester: II
Stream: CSE
Course Name: Data Base Management Systems
Course Code: ECS51108
Maximum Marks: 40
Time duration: 3 Hours
Total No of questions: 08
Total No of Pages: 02

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Instruction to the Candidate:
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Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. **a)** If a relation R(W, X, Y, Z) has Functional dependencies as
W->XY, Z->WY.
Calculate the Candidate key for the relation.
b) Explain many to one cardinality property with example?
c) Explain the concepts of a Primary key and candidate key?
d) What is deadlock? Explain with explain?
e) What is DML compiler? Explain with example?

GROUP –B
(**Short Answer Type Questions**)
Answer *any three* of the following $3 \times 5 = 15$

2. Draw an ER Diagram with the following condition with proper cardinality and symbol. "A company has several departments. Each department has a supervisor and at least one employee. Employees must be assigned to at least one, but possibly more departments. At least one employee is assigned to a project, but an employee may be on vacation and not assigned to any projects. The important data fields are the names of the departments, projects, supervisors and employees, as well as the supervisor and employee number and a unique project number." 5

3. Explain the symbols $\{\sigma, \pi, \cup, -, X\}$ with proper example? 5

4. Explain all type of JOINS with proper example? 5

5. Explain Deferred Database Modification? 5

GROUP –C
(**Long Answer Type Questions**)
Answer *any two* of the following $2 \times 10 = 20$

6. Consider the following schemas: 5+5=10
SALESPEOPLE (snum, sname, city, commission)
CUSTOMERS (cnum, cname, city, rating, snum)

ORDERS (onum, amt, odate, cnum, snum)
snum is the salespeople number, sname is the sales person's name, city is the city they belong from, commission is the commission of the salesperson. cnum is the customer name, cname is the customer name, city is the customer city, rating is the customer name, onum is the order number, amt is the amount of the order, odate is the order date.
Write SQL statements on the following tables:
i) Show the commissions of all the salespersons who receive at least one order of amount greater than Rs. 5,000.
ii) Find all customers located in cities where salesperson 'Amit' has customers.
iii) Show the orders numbers who gave orders on 16.03.2020.
iv) Show the name of the customer names having more than 4 rating.
v) Find the customer names whose order amount is more than 10000.

b). Explain State diagram of a Transaction?

7. Explain ACID property? Explain two phase locking protocol? 5+5=10

8. Explain Conflict serializability with proper example? Explain Deadlock recovery techniques? 3+7=10

ADAMAS UNIVERSITY
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END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech/ BCA/MCA
Stream: CSE/ECE/EE/ME/CE/Biotech
PAPER TITLE: Engineering Ethics, Values and the Laws
Maximum Marks: 40
Total No of questions: 08

Semester: II
PAPER CODE: HEN41119
Time duration: 3 hours
Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
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Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. **a)** The punishment for subsequent conviction for knowingly infringing or abetting infringement of copyright work is ……
b) The two types of traditional forms of cyber-crimes are…… and ……
c) "Phising" is …… form of cyber-crime.
d) An agreement enforceable by law is ……
e) The punishment of intentionally selling goods or providing services to which false trademark or false trade description is applied is……

GROUP –B
(Short Answer Type Questions)

Answer *any three* of the following $3 \times 5 = 15$

2. Write a Short Note on IEEE Code of Ethics.
3. Elaborate the directive principles of State Policy.
4. Name the agencies of cyber security.
5. Write a Short Note on "Piracy".

GROUP –C
(Long Answer Type Questions)

Answer *any two* of the following $2 \times 10 = 20$

6. Decide the following cases:
a. A's wife got abdominal pain. The doctor advised that this was to be operated for appendicitis to which 'A' and his wife reluctantly agreed. The patient was put under chloroform anesthasia. On incision, the appendix was found to be normal. The doctor then made another incision and removed the gall bladder of the patient without taking 'A's' consent, although he was waiting outside the operation theatre. The liver and kidney of the patient which were already damaged, had been further damaged due to the toxic effects of the chloroform and as a result, the patient died on the third day of the operation.
b. The victim was resting her elbow on the window sill. A truck coming from the opposite direction hit her in her elbow and she received serious injuries.

c. Due to heavy rain a factory was flooded with water which got mixed with oily substance. The floors in the factory got slippery. The victim slipped and got injured. What is the liability of the factory?
d. A child visits zoo and put his hands inside the iron bars where a tigress was kept and his hands were crushed by the tigress.
e. A bus conductor invites passengers to travel on the roof of the bus and one of the passengers travelling on the roof is hit by the branch of a tree and falls down and gets killed after the driver swerves the bus to the right to overtake a cart.

7. Discuss the rights of engineers.
8. Describe how sustainable engineering can be beneficial to society.

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ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: **MCA** Semester: **II**
PAPER TITLE: **Discrete Mathematics** PAPER CODE: **SMA51142**
Maximum Marks: **40** Time duration: **3 hours**
Total No of questions: **08** Total No of Pages: **01**

Instruction for the Candidate:
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Answer all the Groups

Group A

Answer all the questions of the following $\mathbf{5 \times 1 = 5}$

1. **a)** What is degree of a vertex in a graph.
b) Find the generators of the group $G = \{1, \omega, \omega^2\}$.
c) Let $A = \{a, b\}$, then what kind of relation is the following relation $\rho = \{(a,a),(b,b),(a,b)\}$.
d) Prove that $[(a' \cup b)' \cap (a \cup b')]' = a' \cup b$.
e) How many ways are there to select 3 books and 2 CDs from 6 books and 5 CDs?

GROUP –B
(Short Answer Type Questions)

Answer *any three* of the following $\mathbf{3 \times 5 = 15}$

2. Find the Disjunctive Normal Form (DNF) of the Boolean expression given by:
$$E(x,y,z) = ((xy)'z)'((x'+z)(y'+z'))'$$
3. Draw the following logic gates and their truth table:
i) OR ii) AND iii) NOT iv) NAND v) NOR
4. Prove that a group $(G,*)$ is commutative, iff $\forall a, b \in G, (a*b)^2 = a^2 * b^2$.
5. Find the greatest common divisor of 252 and 595. Express it in terms of $252s + 595t$.

GROUP –C
(Long Answer Type Questions)

Answer *any two* of the following $\mathbf{2 \times 10 = 20}$

6. a) Prove that a simple graph with n vertices and k components can have at most $\frac{(n-k)(n-k+1)}{2}$ edges.
b) Can you draw a regular graph with 6 vertices and 10 edges?
c) If a graph has exactly two vertices of odd degree then there must be a path joining these two vertices. **5+2+3**

7. a) Simplify the following Boolean expression using Karnaugh Map:
$$E(x,y,z) = xyz + xyz' + x'yz' + x'y'z$$
b) Compute the permutation of $\alpha \circ \beta, \beta \circ \alpha$, and α^2 where α and β are given by $\alpha = \begin{pmatrix} 1&2&3&4&5&6 \\ 2&1&4&5&6&3 \end{pmatrix}$ and $\beta = \begin{pmatrix} 1&2&3&4&5&6 \\ 3&2&4&1&6&5 \end{pmatrix}$. **5+5**

8. a) Find the general solution of the recurrence relation given by
$$a_n + 4a_{n-1} - 21a_{n-2} = 5(4^n), \quad n \geq 2, \quad a_0 = 1, a_1 = 1$$
b) Prove that every cyclic group is commutative.
c) Show that the set of integers is an additive subgroup of set of real numbers. **5+2+3**