

2020/

USN : _____

Course Code : 18CS45

Fourth Semester B.E MAKEUP Examination, AUGUST_OCTOBER_2021
SOFTWARE ENGINEERING

Time: 3 hrs

Max. Marks :100

Instructions : Answer any five full questions. Assume missing data

L CO PO M

- 1a. Define Software Engineering. List and Explain essential attributes of good software? [2] [1] [1] [6]
- 1b. With a neat diagram explain waterfall model? Explain the problems involved in waterfall model? [2] [1] [1] [6]
- 1c. List and explain Software Engineering (ACM/IEEE) Code of Ethics and Professional Practices? [2] [1] [8] [8]
- 2a. Explain the difference between Generic and Customized product with example? [2] [1] [1] [6]
- 2b. Compare and differentiate between Change avoidance & Change tolerance with example. [4] [1] [1] [6]
- 2c. Explain Reuse-oriented developmental model with a neat diagram? Also discuss the benefits of this model as compared to waterfall model? [2] [1] [1] [8]
- 3a. With the neat diagram explain the types of non-functional requirements? [2] [1] [1] [6]
- 3b. Identify and explain 03 Functional and 03 Non-Functional requirements for the GIT Examination software system. [3] [1] [12] [6]
- 3c. Explain in brief the structure of a requirements document that is based on an IEEE standard for requirements documents. [2] [1] [1] [8]
- 4a. Explain with a neat diagram the different steps in the requirements elicitation and analysis process? [2] [1] [1] [6]
- 4b. Describe different metrics for specifying non-functional requirements? [2] [1, 2] [1] [6]
- 4c. List the different formats of specifying system requirement specification. For student admission process in engineering colleges under CET/COMEDK/MANAGEMENT Quota. Use any one of the function you have identified related to admission process and represent it using structured form based specification method. [4] [1] [3] [8]
- 5a. Explain Context model with an example [2] [1] [1] [6]
- 5b. Develop a set of Use Cases that would serve as bases for understanding the requirement for a Software Engineering attendance management system. Note: Actors: Faculty, Students, COE, Dean academics, University. [2] [1] [1] [6]
- 5c. With a neat diagram explain the flow of Analysis model into the design model [2] [2] [3] [6]
- 6a. With a neat diagram explain the difference between plan driven development and Agile Development [4] [4] [3] [8]
- 6b. List and Explain Extream programming practices. [2] [1] [1] [6]
- [2] [3] [1] [6]

Q8. Analyze the credit card due payment method in Banking Application, design 1 card, 2 task cards and 2 test cards for the same.

7a. Describe the factors affecting Software Pricing.

7b. With a neat diagram explain the project planning process.

7c. Draw the 'Activity Bar-chart' for the following project schedule.

Task	Duration	Dependency
T1	10	
T2	15	T1(M1)
T3	15	T1(M1)
T4	10	T2,T4(M3)
T5	10	T1,T2(M4)
T6	5	T1(M1)
T7	20	T4(M2)
T8	25	T3,T6(M5)
T9	15	T7,T8(M6)
T10	15	T7,T8(M6)

8a. List the Project Plan sections and also explain in brief the various Project plan supplements.

8b. Discuss algorithmic cost modeling formula to show the efforts put in to predict project costs

Calculate the Effort where organizational dependent constant is 2, B=1.05. Multiplier is 1, size is 10.

8c. Define Project Scheduling. With a neat diagram explain project scheduling process in a plan driven project?

9a. Explain with a neat diagram input-output model for program testing.

[2] [4] [3] [4]

9b. With a neat diagram explain test driven development process.

[2] [4] [3] [4]

9c. Elective Subject allocation for 7th semester students is done by the Head of the Department of CSE through web interface software. Analyze the given requirements and design test cases for the same by using Requirements-based testing. "For the 7 semester students of the CSE, department needs to allocate Elective subject based on student's previous semester academic performance and the subject preferences given by the student in the subjects of relative domain. If a student has performed less in a particular domain, then allocation of an elective in a relative domain shall produce warning message being issued by the Head of the department. If the Head of the Department chooses to ignore the warning, then he has to provide valid reason why this warning has been ignored".

[4] [4] [3] [4]

10a. Explain with a neat diagram model of software testing.

[2] [4] [3] [4]

10b. Define equivalence partition testing? Analyze the following scenario by using equivalence partition method (Identify valid and invalid partitions). Assume we have to enter text field (Name) that accepts the length between 6-12 characters.

[4] [4] [3] [4]

10c. With a neat diagram explain acceptance testing process and also discuss its stages.

[2] [4] [3] [4]

Fourth Semester B.E MAKEUP Examination, AUGUST OCTOBER 2021
DATABASE MANAGEMENT SYSTEM

Time: 3 hrs

Max. Marks : 100

Instructions : Answer any Five full Questions. 2 All units carry equal marks.

L CO PO M

a. Discuss the main characteristics of the database approach and how it differs from traditional file systems. [2] [1] [1] [10]

b. Identify the entities, attributes, relationships and cardinality ratios for the following and then sketch an Entity-Relationship diagram based on the following business rules:

1. A salesperson may manage many other salespeople.
2. A salesperson is managed by only one salesperson.
3. A salesperson can be an agent for many customers.
4. A customer is managed by one salespeople.
5. A customer can place many orders.
6. An order can be placed by one customer.
7. An order lists many inventory items.
8. An inventory item may be listed on many orders.
9. An inventory item is assembled from many parts.
10. A part may be assembled into many inventory items.
11. Many employees assemble an inventory item from many parts.
12. A supplier supplies many parts.
13. A part may be supplied by many suppliers.

[3] [2] [3] [10]

a. Explain the three-schema architecture. Why do we need mappings between schema levels? [2] [1] [1] [10]

b. Analyze a hospital management system and sketch an Entity-Relationship diagram by :

- o Identifying the various entities and their attributes,
- o Specifying the key attributes of each entity type,
- o Identifying the various relationships between the entities and
- o The structural constraints on each relationship type.

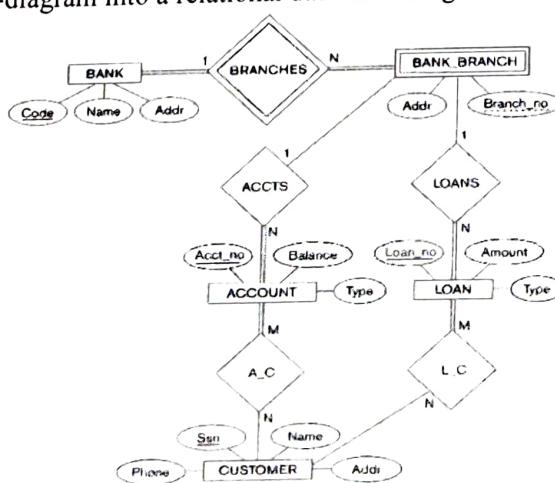
Take appropriate assumptions and state the same.

[4] [2] [3] [10]

c. With an example explain the different types of join operations in Relational Algebra.

[2] [1] [1] [10]

d. Consider the ER diagram given below. Apply the ER-to-Relational mapping algorithm to map the following ER-diagram into a relational database design.



[3] [2] [3] [5]

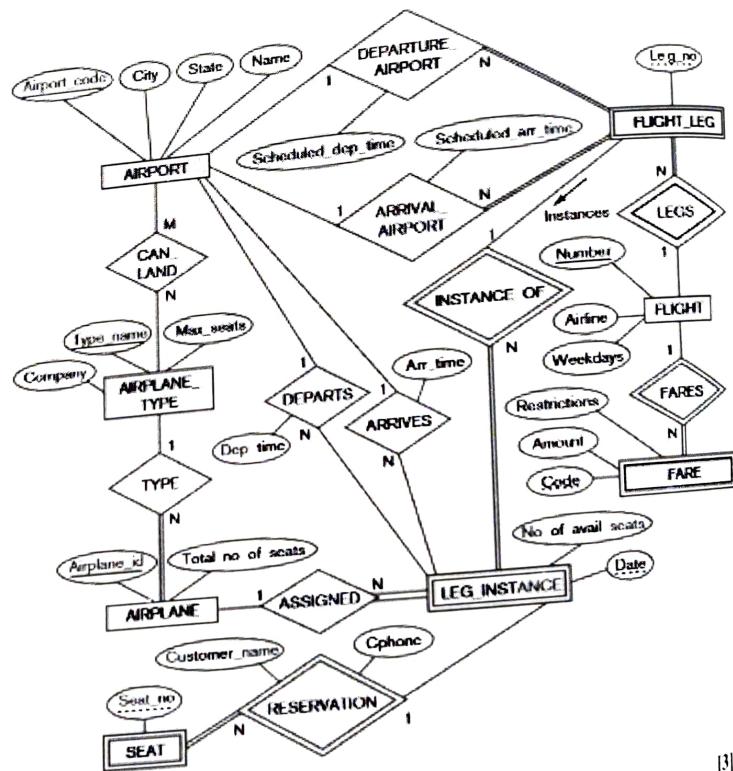
3c. Consider the following schema for a library database:

Author (authorname, citizenship, birthyear)
 Book(isbn, title, authorname)
 Topic(isbn, subject)
 Branch(libname, city)
 Branch(libname, libname, quantity)
 Instock(isbn, libname, quantity)

Solve for the following queries by writing relational algebra expressions:

1. Give all authors born after 1940.
2. Give the names of libraries in Sydney.
3. Give the title of each book on the topic of either alcohol or drugs.
4. Give the title and author of each book of which at least two copies are held in a library located in Melbourne.
5. Give the name of each Italian author who wrote an autobiography.

4a. Consider the ER diagram for an AIRLINE database schema given below. Apply the Relational mapping algorithm to map the following ER-diagram into a relational design.



4b. How is an inner join different from an outer join?

Consider the PRICES and QUANTITIES tables and show the output of the following:

1. PRICES \bowtie QUANTITIES

2. PRICES \bowtie Prices.product = Quantities.product QUANTITIES

3. PRICES \bowtie Prices.product = Quantities.product QUANTITIES

4. PRICES \bowtie Prices.product = Quantities.product QUANTITIES

TABLE 1: PRICES

PRODUCT	PRICE
Potatoes	\$3
Avocados	\$4
Kiwis	\$2
Onions	\$1
Melons	\$5
Oranges	\$5
Tomatoes	\$6

TABLE 2: QUANTITIES

PRODUCT	QUANTITY
Potatoes	45
Avocados	63
Kiwis	19
Onions	20
Melons	66
Broccoli	27
Squash	92

[2] [1] [3] [5]

Explain the following with an example for each:

Domain Constraint 2) Super key 3) Candidate key 4) Entity integrity constraint 5) Referential integrity constraint

[2] [1] [1] [5]

Consider the following relation schema:

CAR_SALE(Car#, Date_sold, Salesperson#, Commission%, Discount_amt)

Assume that a car may be sold by multiple salespeople, and hence {Car#, Salesperson#} is the primary key.

Additional dependencies are:

Date_sold → Discount_amt and

Salesperson# → Commission%.

Based on the given primary key, is this relation in 1NF, 2NF, or 3NF? Why or why not? How would you successively normalize it completely? Apply normalization until you cannot compose the relations further. State the reasons behind each decomposition.

[3] [3] [2] [10]

Discuss the ACID properties of a database transaction.

[2] [5] [1] [5]

Draw a state diagram and discuss the typical states that a transaction goes through during execution.

[2] [5] [1] [5]

What is normalization and why is it needed? Explain the 1NF, 2NF and 3NF with an example for each.

[3] [3] [2] [10]

What is a lock? Explain the different types of locks used in concurrency control?

[2] [5] [1] [5]

What is the two-phase locking protocol? How does it guarantee serializability?

[2] [5] [1] [5]

Explain the various DML commands used in SQL along with their syntax.

Assume the following relational database: STUDENT (USN, NAME, SEM, DNO) DEPARTMENT (DNO, DNAME, DLOC)

[2] [4] [1] [10]

COURSE (COURSE#, CNAME, CREDIT, TYPE)

ROLL (USN, COURSE#, SCORE)

Write appropriate SQL DDL statements to define the database.

Infer SQL queries for the following:

List all students who are studying in 'Mechanical Engineering Department' and are in 4th semester.

List names of all students who are in 5th semester and have opted for elective courses and belong to 'CSE' department.

List the Department wise total number of students.

List the department that has maximum number of students.

Total number of students who are in 2nd semester and have scored above 15 in 'Maths' etc.

8a. List and explain the various constraints used in SQL with an example for each [2] [4]

8b. Consider the CUSTOMERS table having the following records; [2] [4]

ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	35	Ahmedabad	2000.00
2	Khilan	25	Delhi	1500.00
3	kaushik	23	Kota	2000.00
4	Chaitali	25	Mumbai	6500.00
5	Hardik	27	Bhopal	8500.00
6	Komal	22	MP	4500.00
7	Muffy	24	Indore	10000.00

Solve by inferring the output of the following SQL queries? Illustrate the output in table/other form as applicable.

- i) `SELECT * FROM CUSTOMERS WHERE ID IN (SELECT ID FROM CUSTOMERS WHERE SALARY >4500);`
- ii) `UPDATE CUSTOMERS SET SALARY = SALARY * 0.25 WHERE AGE IN (SELECT AGE FROM CUSTOMERS WHERE AGE >= 27);`
- iii) `SELECT AGE FROM CUSTOMERS GROUP BY age HAVING COUNT(age) >= 2;`
- iv) `SELECT NAME, Max(Salary)AS MAX_SALARY ,Min(Salary) AS MIN_SALARY ,Avg(Salary)AS AVG_SALARY FROM CUSTOMERS;`
- v) `DELETE FROM CUSTOMERS WHERE AGE IN (SELECT AGE FROM CUSTOMERS WHERE AGE>=27);`

8c. Explain with syntax how the ALTER TABLE statement can be used to add, delete, or modify columns in an existing table and to add, drop various constraints on an existing table. [2] [4] [1]

9a. Differentiate between a PL/SQL function and a procedure? Explain with syntax how a standalone function can be created in PL/SQL. Develop a PL/SQL function that computes the maximum of two values. [2] [4] [1]

9b. When would you use a PL/SQL loop? With syntax and an example , explain the PL/SQL FOR and WHILE loops [2] [4] [1]

9c. Define a cursor. Compare implicit and explicit cursors. [2] [4] [1]

10a. What is the difference between a function and procedure in PL/SQL? Explain with syntax how a procedure can be created in PL/SQL. Develop a PL/SQL procedure takes two numbers using IN mode and returns their minimum using OUT parameters. [2] [4] [1]

10b. What are the components of PL/SQL block structure? Explain with syntax and an example [2] [4] [1]

10c. Define a trigger. Explain the syntax for creating a trigger. [2] [4] [1]

2020/

Course Code : 18CS42

USN : _____

Fourth Semester B.E MAKEUP Examination, AUGUST_OCTOBER_2021

OPERATING SYSTEM

Max. Marks : 100

L CO PO M

Time: 3 hrs

Instructions : 1. Answer any five full questions.

- 1a. What is the need of an operating system ? Explain the four components of a computer system with a neat diagram. [2] [1] [1] [6]
- 1b. Define system call ,explain different types of system calls with 2 examples for each. [2] [1] [1] [8]
- 1c. Explain any 6 features of UNIX Operating System. [2] [1] [1] [6]
- 2a. Define operating system, illustrate the Dual mode operation of an operating system. [2] [1] [1] [6]
- 2b. Explain different services provided by an operating system. [2] [1] [1] [8]
- 2c. Explain the structure of any Three internal/ external UNIX commands and illustrate their use. [2] [1] [1] [6]
- 3a. Define a process. With the help of a neat diagram explain the Process Control Block. [2] [2] [1] [6]
- 3b. Calculate the average waiting times for the given processes using preemptive SJF and Non-preemptive SJF scheduling algorithms. Draw the neat Gantt Chart for both.

Process	Arrival time	CPU burst time(ms)
P1	0	8
P2	1	4
P3	2	9
P4	3	5

[4] [2] [1, 2] [8]

- 3c. Explain Priority Scheduling Algorithm with its advantages and disadvantages. [2] [2] [1] [6]
- 4a. With the help of a neat diagram explain the Process State Diagram. [2] [2] [1] [6]
- 4b. Consider the following set of Processes, with their CPU Burst in milliseconds.

Process Burst Time

P1	8
P2	10
P3	9
P4	5

1. Draw the Gantt Chart by applying SJF and Round Robin (time Quantum=5 ms) scheduling algorithms.

2. Calculate average waiting time and average turn around time for both the scheduling algorithms.

3. Explain different scheduling criteria that must be kept in mind while choosing scheduling algorithms [4] [2] [1, 2] [8]

[2] [2] [1] [6]

5a.	What is Race condition? Explain the general structure of a process while solving a section problem.
5b.	What is a critical section problem? Explain the Peterson's solution.
5c.	Explain the necessary conditions that are required for the occurrence of Deadlock.
6a.	Define Semaphores along with its implementation.
6b.	A system consists of five processes and three resource types (A, B, C). Resources A has 10 instances, B has 5 instances and C has 7 instances. The following snapshot of the system has been taken:

	Allocation			Max			Available		
	P0	0	1	0	7	5	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Compute the Need matrix, and Analyze the system for the safe sequence by using Banker's algorithm. Mention whether the above system is safe or not.

6c. Illustrate the Dining Philosophers problem of process synchronization with a neat diagram.

7a. What is paging? Explain the hardware support for paging using TLB with a neat diagram.

7b. For the following reference string, determine the page faults that occur using FIFO LRU page replacement algorithms for 3 and 4 page frames.
Reference string: 5, 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5

8a. With a block diagram explain the process of swapping of two processes in memory.

b. For the following reference string, determine the page faults that occur using LRU Optimal page replacement algorithms for 3 and 4 page frames. Reference string: 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1.

9a. Explain the file attributes and file operations, briefly.

9b. Explain file mounting with an example.

10a. List and explain the different file access methods.

10b. Explain the different types of directory structures, with examples and advantages and disadvantages.

15CS1553/16CS1553

Max. Marks: 100

July/August 2019

Semester B.E. Fast Track Semester End Examination

SOFTWARE ENGINEERING

3 Hours

- Instructions:**
1. UNIT I & III are Compulsory.
 2. Answer any one full question from remaining each UNITS.

UNIT - I (Compulsory)

List out the reasons for software failures and explain the definition of software engineering.

What are the attributes of good software and explain the fundamental activities of software engineering.

List and explain different types of applications.

UNIT - II

What are the factors that affect software pricing.

Discuss the point to decide on balance between plan driven and agile approach.

List and describe the principles of agile methods.

OR

Explain the difficulties of agile method.

Explain extreme programming release cycle with a neat diagram.

Discuss the project scheduling process.

UNIT - III (Compulsory)

Define user requirement and system requirement, and give an example of mental health care patient management system (MHC-PMS).

Explain how to write a structured specification of a requirement for an example of insulin pump system.

Explain the different types of non functional requirements.

UNIT - IV

Apply system testing to weather data collection system.

(4) (4) (2) (10)

Draw design models and sequence diagram for data collection in weather information system.

(2) (4) (2) (10)

OR

Explain the inspection and testing process with diagram.

(2) (4) (1) (10)

What is context and interaction in object oriented design with UML. Explain with an example.

(2) (3) (2) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

UNIT -V

- 7 a. With the figure, explain change management process and list out point to be considered for acceptance. (2) (3)
- b. Explain ISO9001 and quality management with figure. (2) (3)
- OR**
- 8 a. List and explain configuration management terminology and configuration management (2) (4)
- b. Why software quality is not directly comparable with manufacturing? Give reasons for implementation of software standards. (2) (4)
- c. Explain the process based quality with example. (2) (4)

Semester B.E. Fast Track Semester End Examination, July/August 2019
DESIGN AND ANALYSIS OF ALGORITHMS

hours

Max. Marks: 100

Instructions: 1. UNIT I & III are Compulsory.
 2. Answer any one full question from remaining each UNITS.

UNIT - I (compulsory)

Define algorithm. Write different algorithms to find greatest common divisor of two given numbers.

L CO PO M

(3) (1) (1) (10)

Write an algorithm for bubble sort. Demonstrate the working with sample input and calculate its time complexity.

(3) (1) (2) (10)

L CO PO M

UNIT - II

Write an algorithm for quick sort and apply for the list 33,21,26,13,32.

(3) (2) (1) (08)

Explain the working of binary search and write an algorithm for it.

(2) (2) (2) (07)

List and explain different variation of decrease and conquer method.

(2) (2) (1) (05)

OR

Write an algorithm for Breadth First Search(BFS) and Depth First search(DFS). And apply for the given graph in figure 3a.

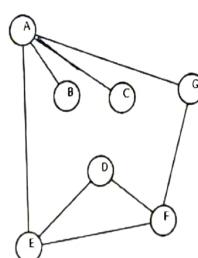


Fig. 3a.

(4) (3) (4) (10)

b. Define heap. And write an algorithm for heap sort and analyze its complexity.

(4) (3) (10) (10)

L CO PO M

UNIT - III (compulsory)

a. Write an algorithm of Dijkstra's for single source shortest path and apply it for given graph in figure 4a.

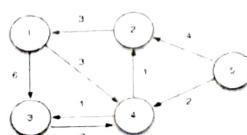


Fig. 4a.

(4) (3) (10) (10)

b. Write kruskal's algorithm.

(3) (2) (2) (04)

c. Write Huffman's tree algorithm and discuss.

(3) (2) (2) (06)

- b. What is travelling - (2)
 c. Write an algorithm for Floyd's algorithm and state its time complexity. (3)

OR

- 6 a. Write a Memory function knapsack algorithm. Apply bottom up dynamic programming to the following instances of the knapsack problem. Consider the capacity as $W=10$. (2)

Item	Weight	Value
1	7	42
2	3	12
3	4	40
4	5	25

- b. Apply floyd's algorithm for a given graph and show step by step adjacency matrix. (4)

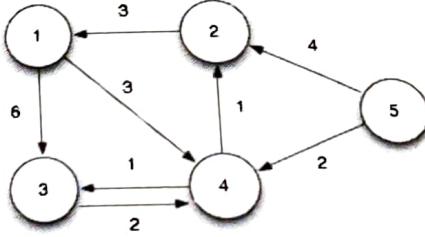


Fig. 6b.

UNIT -V

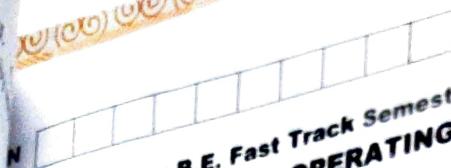
- 7 a. Write a horspool's algorithm and discuss different cases in comparison of texts. (2)
 b. Apply backtracking to solve the following instances of the subset sum problem. $d = 13$. Draw state space tree for the solution. (3)

OR

- 8 a. Solve given assignment problem using branch and bound technique. (3)

	Machines				
	A	B	C	D	E
Job	5	7	11	6	7
1					
2	8	5	5	6	5
3	6	7	10	7	3
4	10	4	8	2	4

- b. Write rabin-karp algorithm and demonstrate with an example. (3)



Fourth Semester B.E. Fast Track Semester End Examination, July/August 2019

OPERATING SYSTEM

3 Hours

- Instructions:**
1. **UNIT I and UNIT III are compulsory.**
 2. Answer any three full questions from the remaining units.

UNIT - I (Compulsory)

List and explain in brief the services of an operating system.

(2) (1) (1) (10)

Discuss with diagram multithreading models.

(2) (1) (1) (10)

List the activities of operating system with respect to process management and file management.

(2) (1) (1) (10)

With a neat process state transition diagram, explain the different states of a process.

(2) (1) (1) (10)

Consider the following set of processes with Arrival Time and CPU Burst Time in milliseconds.

(3) (1) (1) (10)

Process	Arrival Time	Burst Time
P1	0	12
P2	1	5
P3	2	7
P4	3	6
P5	4	3

Apply SJF and Round Robin algorithms. Draw Gantt Chart. Compute the Average Waiting Time and Average Turn Around Time.

(4) (2) (4) (10)
(2) (2) (1) (03)

- c. Discuss the different types of schedulers.

OR

- a. Explain
- a. CPU utilization
 - b. Throughput
 - c. Turnaround Time
 - d. Waiting time
 - e. Response time
- (2) (2) (1) (05)
- b. Discuss with diagram multithreading models.
- (2) (2) (1) (07)
- c. Discuss the Dining Philosopher problem.
- (2) (2) (1) (08)

L CO PO M

UNIT - III (Compulsory)

- a. What is deadlock. Explain the necessary conditions for deadlocks.
- (2) (3) (1) (06)
- b. A system consists of five processes and three resource types (A,B,C). The following snapshot of the system has been taken.

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3			
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2	4	5	2
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Find the need matrix , and analyze the system for the safe sequence by using Banker's algorithm.
Mention whether the above system is safe or not.

- c. Draw the resource allocation graph for the following system.

Resource Instances :

- One instance of resource type R1
- Two instances of resource type R2
- One instance of resource type R3
- Three instances

Process states:

- Process P1 is holding an instance of resource type R2 and is waiting for an instance of R1.
- Process P2 is holding an instance of R1 and an instance of R2 and is waiting for an instance of R3.
- Process P3 is holding an instance of R3.

Check whether deadlock occurred or not.

UNIT - IV

- 5 a. Explain the difference between internal fragmentation and external fragmentation. (3) L (2) CO (2) PO (1)
- b. Explain with diagram the Compile time, Load time, and Execution time address binding for multistep processing of a user program. (2) (3) (1)
- c. Consider the following reference string. (2) (3) (1)
7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1 3 for a memory with three frames. How many page faults occur for FIFO and Optimal page replacement algorithms.? Compare and comment on the efficiency of algorithm.

OR

- 6 a. Discuss multistep processing of a user program. (4) (4) (1)
- b. What is Paging? Discuss with diagram paging hardware. (2) (3) (1)

UNIT - V

- 7 a. Discuss file access methods. (2) (1) (2)
- b. Explain the layered design of a file system. (2) (3) (1)

OR

- 8 a. What is a file? List and explain the various File Attributes and file operations. (2) (3) (1)
- b. Discuss different ways of protecting files in the system. (2) (3) (1)

Fourth Semester B.E. Makeup Examination, May/June 2018-19**DATABASE MANAGEMENT SYSTEM**

3 Hours

Max. Marks: 100

- Instructions:**
1. **UNIT III and UNIT V** are compulsory.
 2. Answer one complete question from the remaining units.
 3. Make suitable assumptions if required.

UNIT - I

L CO PO M

List and explain in brief, any five advantages of using the DBMS approach. And explain the responsibilities of actors on the scene for database system environment.

(2) (1) (02) (10)

Suppose that you are a database designer and you have been approached to design a database for Bank system. Make appropriate assumptions to:.

- 1) Identify minimum four entities and their attributes,
- 2) List the attributes and specify the key attributes of each entity type,
- 3) Identify the various relationships between the entities,
- 4) The structural constraints on each relationship type
- 5) Analyze the given scenario and model the same conceptually using an E-R Diagram.

(3) (1) (2,3) (10)

OR

Explain the three schema architecture of DBMS using neat diagram.

(2) (1) (10) (05)

A university database contains information about professors, courses, classes, department and books. Identify suitable relations. Justify cardinality and participation constraints for the same with examples. Sketch a neat ER diagram.

(4) (2) (2,3) (10)

Explain the responsibilities of actors behind the scene for database system environment.

(2) (1) (2) (05)

UNIT - II

L CO PO M

Consider the following relational schema.

Emp(eid,ename, age, salary)

Works_for(eid, pid, Hours)

Project(pid, pname)

Write the queries in relational algebra for the following:

- 1) Retrieve employee id and name of the employee who works for all the projects.
- 2) Retrieve name and age of employees whose salary > 10000.
- 3) For each employee, get the number of projects and number of hours worked on projects.
- 4) Retrieve names of employees working on 'CSE' project.
- 5) Retrieve name and age of the employees who works on project for more than 3 hours.

(5) (2) (3) (10)

Explain the various Relational Algebra Operations from Set Theory with an example for each.

(2) (2) (2) (10)

OR

Explain SELECT, PROJECT and OPERATIONS from Set Theory in relational algebra with example.

(2) (2) (2) (10)

Explain the following with an example for each.

- 1) Inner join
- 2) Left join
- 3) Full join

(2) (2) (2) (10)

UNIT - III (Compulsory)

- 5 a. Explain 1NF, 2NF, 3NF and BCNF with suitable examples.

- b. Define Transaction. Explain with example (i) The Lost Update Problem (ii) Incorrect Summary

UNIT - IV

- 6 a. **Given the schema**

CAR(Serial_no, Model, Manufacturer, Price)
 OPTION(Serial_no, Option_name, Price)
 SALE(Salesperson_id, Serial_no, Date, Sale_price)
 SALESPERSON(Salesperson_id, Name, Phone)

Identify SQL statements for following:

- (i) Find the list of car manufacturers and models who are quoting price less than Rs: 3,50,000
 (ii) Retrieve the names and phone of salesperson who have sale price greater than Rs: 50,000
 (iii) List all the option names available for car model = "AUDI"
 (iv) List the names and phone numbers of salesperson for manufacturer = "FORD ICON"

(4) (2)

- b. Demonstrate DROP, ALTER, UPDATE, commands with an example for each.

(3) (2) (3,1)

OR

- 7 a. Consider the following database of student enrolment in courses & books adopted for each course

STUDENT (regno: string, name: string, major: string, bdate:date)
 COURSE (course:int, cname:string, dept:string)
 ENROLL (regno:string, course:int, sem:int, marks:int)
 BOOK _ ADOPTION (course:int, sem:int, book-ISBN:int)
 TEXT (book-ISBN:int, book-title:string, publisher:string, author:string)

Write SQL queries :

- to create all the tables
- to add a record to STUDENT and COURSE table
- to delete a record from BOOK _ ADOPTION table
- to search for a record in TEXT table where publisher name is "Penguin"

(3) (4)

- b. Explain the different Aggregate functions used in SQL, with examples.

(2) (2)

UNIT - V (Compulsory)

- 8 a. Discuss the basic structure of a PL/SQL block with its components with a suitable example.

(2) (2)

- b. Illustrate the syntax with suitable examples (i) PL/SQL function (ii) PL/SQL procedure.

(2) (2)

- c. Illustrate the PL/SQL statements with syntax and suitable examples (i) if-else (ii) case.

(2) (2)

Fourth Semester B.E. Makeup Examination, May/June 2018-19
DESIGN AND ANALYSIS OF ALGORITHMS

Max. Marks: 100

3 Hours

- Instructions:**
1. UNIT-I and UNIT-III are compulsory
 2. Answer any one full question from remaining units

L	CO	PO	M
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UNIT - I (Compulsory)

- a. Explain design and analysis process with a neat labeled diagram. (2) (1) (1) (07)
- b. Explain with appropriate examples three asymptotic notations. (2) (1) (1) (09)
- c. If $M(n)$ denotes the number of moves in tower of Hanoi puzzle when n disks are involved, give a recurrence relation for $M(n)$ and solve this recurrence relation. (4) (1) (1) (04)

UNIT - II

- a. Write an algorithm for insertion sort .Analyze its worst case efficiency. (4) (2) (2) (08)
- b. Write Quick sort algorithm and apply the same on the following list and draw recursive call tree :10,80,30,90,40,50,70. (3) (2) (2) (08)
- c. Find the upper bound of recurrences given below by substitution method.
 a) $T(n) = 2T(n/2)+1$ b) $T(n) = T(n-1)+n$ (3) (2) (2) (04)

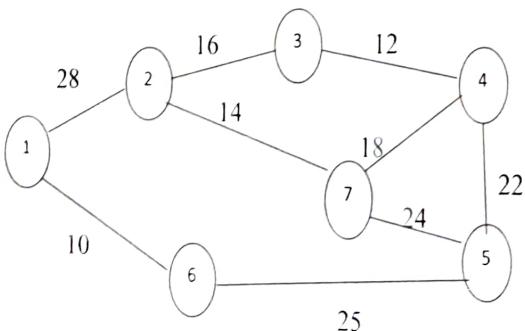
OR

- a. Outline the heapsort algorithm along with Heapify function and apply the same for the following list 15, 19, 10, 7, 17, 16 using heap sort. Show all the steps for sorting the list. (3) (2) (2) (10)
- b. Design an algorithm for binary search, Give an example. Show that the worst case efficiency of binary search is $\theta(\log n)$. (4) (2) (2) (06)
- c. Write an algorithm for merge sort .Analyze its efficiency. (4) (2) (2) (04)

UNIT - III (compulsory)

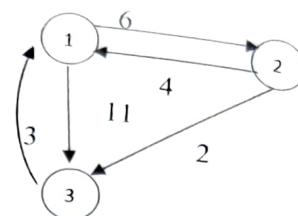
L	CO	PO	M
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- a. Write Prim's algorithm to find minimum cost spanning tree. (2) (3) (1) (06)
- b. Write Dijkstra's algorithm to find single source shortest paths. (2) (3) (1) (06)
- c. Determine minimum cost spanning tree for the graph using prim's algorithm. Show the steps in tabular form.



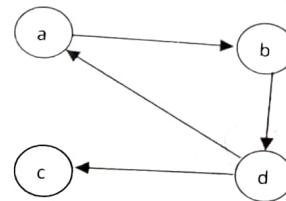
(3) (3) (2) (08)

- 5** a. Write Floyd's algorithm for all pairs shortest paths problem.
 b. Apply Floyd's algorithm to the graph shown below.



- c. Define dynamic programming and show how it is applied to compute relation used and the computations in tabular form.

- 6** a. Write Warshall's algorithm to construct the transitive closure of a given digraph.
 b. Apply Warshall's algorithm to find the transitive closure for the digraph shown below.



- 7** a. Describe Horspool's algorithm with pseudo code using input enhancement in string matching
 b. With necessary state space tree for N queens problem, explain the solving of 4 queens problem by backtracking.

- 8** a. Explain Hamiltonian circuit problem. Apply backtracking method to solve subset sum problem for the instance $S = \{1, 2, 3, 5, 6, 7\}$ and $d = 15$.
 b. Solve the following assignment problem.

C=	job1	job2	job3	job4	
	9	2	7	8	person a
	6	4	3	7	person b
	5	8	4	8	person c
	3	9	9	4	person d

(3) (5) (2)

Fourth Semester B.E. Makeup Examination, May/June 2018-19

OPERATING SYSTEM

Max. Marks: 100

Hours

- Instructions:**
1. **UNIT I and UNIT III are compulsory.**
 2. **Answer any five full questions from the remaining units**

UNIT - I (Compulsory)

Define Operating System. Explain the different operating system services which are provided for the convenience of the programmer and also ensuring the efficient operation of the system itself.

L CO PO M
(2) (1) (1) (10)

Discuss multiprocessor system with advantages.

(2) (1) (1) (5)
(1) (1) (1) (5)

List the activities of operating system with respect to process management and file management.

L CO PO M
(2) (1) (1) (5)

UNIT - II

Explain the concept of scheduling queues with a neat diagram along with the different types of schedulers.

(2) (2) (1) (10)

Compare average waiting time and average turnaround time for the processes given in the below figure using i) FCFS ii) Preemptive SJF Scheduling algorithms.

Process	Arrival time(ms)	CPU Burst time(ms)
P1	0	8
P2	1	4
P3	2	9
P4	3	5

(4) (2) (2) (10)

OR

a. What are semaphores? Illustrate the Dining- Philosophers problem and provide a solution using semaphores.

(2) (2) (1) (10)

b. Compare average waiting time and average turnaround time for the processes given in the below figure using i) FCFS ii) Preemptive priority (low value indicates high priority) scheduling algorithms.

Process	Arrival time(ms)	CPU Burst time(ms)	Priority
P1	0	7	3
P2	2	3	2
P3	2	8	1
P4	3	4	4

(4) (2) (2) (10)

L CO PO M

UNIT - III (Compulsory)

a. What is deadlock. Explain the necessary conditions for deadlocks.

(2) (2) (1) (04)

- b. A system consists of five processes and three resource types (A,B,C). Resource instances, B has 5 instances, and C has 7 instances. The following snapshot of the system is taken.

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3			
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3	3	3	2

Find the need matrix, and analyze the system for the safe sequence by using Banker's algorithm. Mention whether the above system is safe or not.

- c. Explain the necessary conditions to prevent the occurrence of a deadlock. (4) (2)
5. a. Explain the difference between internal fragmentation and external fragmentation. (2) (2)
L CO
- b. Explain with diagram the Compile time, Load time, and Execution time address space of multistep processing of a user program. (2) (3)
- c. Consider the following reference string. (2) (3)
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 frames are required for LRU, FIFO page replacement algorithms? Compare and comment on the efficiency of each algorithm.

OR

6. a. Discuss the following terms: i) Swapping ii) Continuous memory allocation. (4) (3)
- b. What is Translation Look-aside Buffer(TLB)? Explain with diagram paging hardware with its working principle. (2) (3)

UNIT - V

7. a. Explain with diagram sequential file access method Vs Direct access method. (2) (3)
- b. Explain the layered design of a file system. (2) (3)

OR

8. a. What is a file? List and explain the various File Attributes and file operations. (2) (3)
- b. Explain the different types of directory structure with examples and mention their advantages and disadvantages. (2) (3)

Sixth Semester B.E. Semester End Examination, May/June 2018-19
 hours
DATABASE MANAGEMENT SYSTEM

Max. Marks: 100

- Instructions:**
1. Answer any 5 full questions.
 2. Unit - I and Unit - IV are compulsory.
 3. Answer any one full question from remaining Units.

UNIT - I (Compulsory)

L CO PO M

Write a note on various types of actors on the scene who use the DBMS.

(1) (1) (2) (10)

Classify the following to the category they belong to. i.e Actors on the scene and workers behind the scene.

- | | | |
|----------------------|----------------------|------------------------------|
| 1) Tool developers | 2) Casual end users | 3) Operators and maintenance |
| 4) Database designer | 5) DBMS implementers | 6) DBA |

(3) (1) (2) (06)

Explain the implicit properties of the database.

(2) (1) (2) (04)

UNIT - II

L CO PO M

Suppose that you are a database designer and you have been approached to design a database for MOVIE. Analyze the given scenario and model the same conceptually using an E-R diagram. Make appropriate assumptions and state the same.

- 1) Identify the various entities and their attributes,
- 2) Specify the key attributes of each entity type,
- 3) Identify the various relationships between the entities,
- 4) The structural constraints on each relationship type

(3) (1) (3) (12)

With respect to ER model, explain the following with an example

Composite attribute 2) Derived attribute 3) Multi-value attribute 4) Weak-entity

(2) (1) (2) (08)

OR

List and explain the different types of attributes used in ER modeling along with an example.

(2) (2) (2) (08)

Suppose that you are a database designer and you have been approached to design a database for BANK. Analyze the given scenario and model the same conceptually using an E-R diagram. Make appropriate assumptions and state the same.

- 1) Identify the various entities and their attributes,
- 2) Specify the key attributes of each entity type,
- 3) Identify the various relationships between the entities,
- 4) The structural constraints on each relationship type

(3) (2) (3) (12)

UNIT - III

L CO PO M

Explain the various Relational Algebra Operations from Set Theory with an example.

(2) (2) (2) (10)

- b. Explain different types of JOIN operations in relational algebra with an example. (2) (2)

- OR**
- 5 a. Consider the following relational schema; (2)
 Users (uid,uname,cost)
 Groups (gid, title, category, n, gsize, owner)
 Posts (pid, uid, gid, tid, ptext,pdate)
 Write the following queries in relational algebra

- 1) Show the text id of all the posts made by user id 4 before May 1, 2019.
 2) Show the names of all the users who responded to post number 2.
 3) Show the uid of all the users who are group owners and posted a thread on June 8, 2018.

- b. Explain the SELECT and PROJECT operations in relational algebra with example. (5) (2) (4)

UNIT - IV (Compulsory)

- 6 a. Explain the various Informal Design guidelines for relational Schema. (2) (2) (2)
 b. Explain the following with an example (2) (3) (2)
 1) First normal form 2) Second normal form 3) Third normal form

UNIT - V

- 7 a. Explain the various constraints in SQL. (2) (3) (2)
 b. Consider the following table(STAFF)

FID	Fname	City	Dept	Salary
1	Amit	Belgaum	CSE	5000
2	Samit	Mumbai	CSE	4000
3	Abhishek	Pune	EC	5000
5	Sahil	Dharwad	MECH	9000
6	Mohit	Belgaum	CSE	12000

Write the SQL queries for the following along with the sample output.

- a. List all the faculties whose salary is less than 10000;
 b. Update the salary of all the employees to 25000 who belongs to department of CSE.
 c. Display all the details of the employee whose name's second alphabet is 'b' and fourth alphabet is 'i' and name should end with 'k' alphabet.
 d. Display the employee details in the order of their decreasing salary.
 e. Display the details of the employee who stays in 'Belgaum' and salary should be in the range of 5000 to 10000.
 f. Count the number of faculty that belongs to 'CSE' department. (5) (3) (4)

OR

- 8 a. Explain the various DDL and DML commands in SQL. (2) (3) (2)

Consider the following Database Schema :

Person(Pid, Pname, Paddress)

Works (Pname, Cname, Salary)

Lives (Pname, Street, City)

Located in (Cname, City)

Manager (Pname, Mgrname)

Write SQL queries the following:

- 1) Find the names of all persons who live in the city "Bangalore".
- 2) Retrieve the names of all person of "Infosys" whose salary is between Rs 50,000 and Rs 90,000.
- 3) Find the names of all persons who lives and work in same city.
- 4) List the names of the people who work for "Tech M" along with the cities they live in.

(5) (3) (4) (12)

Fourth Semester B.E. Semester End Examination, May/June 2018-19
DESIGN AND ANALYSIS OF ALGORITHMS

3 Hours

Max. Marks: 100

- Instructions:**
1. Unit I and Unit III are compulsory
 2. Solve at least one question from remaining units.
 3. Diagrams if any must be drawn neatly.

UNIT - I

Define the term algorithm and illustrate the notion of algorithm with an example.

Prove that :if $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$ then $t_1(n)+t_2(n) \in O(\max\{g_1(n), g_2(n)\})$

(2) (1) (1) (06)

(3) (1) (2) (08)

Consider the following algorithm:

Algorithm Mystery(n)

//input:A non negative integer n

S $\leftarrow 0$

for i $\leftarrow 1$ to n do

S $\leftarrow S + i * i$

return S

- a) What does this algorithm compute? b) What is its basic operation?
 c) How many times the basic operation is executed? d) What is the efficiency class of this algorithm?

(4) (1) (1) (06)
 L CO PO M

UNIT - II

Write algorithm for binary search. Analyze the algorithm's average case efficiency.

(4) (2) (1) (06)

Write algorithm for Merge-sort.

(2) (2) (1) (06)

Explain three variations of decrease and conquer approach. Write the algorithm for breadth first search.

(2) (2) (1) (08)

OR

Consider the numbers given below. Show how partitioning function of quick sort algorithm will sort all the elements in the list. Show all the steps clearly. 106, 117, 128, 134, 141, 91, 84, 63, 42.

(3) (2) (1) (05)

Write algorithm for HeapBottomUp. Illustrate heap construction for the elements 2, 9, 7, 6, 5, 8.

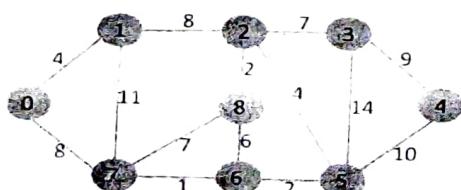
(2) (2) (1) (10)

Write algorithm for depth first search.

(2) (2) (1) (05)
 L CO PO M

UNIT - III

Outline Prim's algorithm and find Min-Cost spanning tree for the following graph. Show all the steps in the tabular form.



(3) (3) (2) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

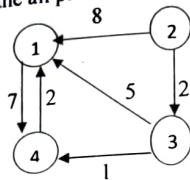
- b. Construct the Huffman tree and list the codes for the following alphabets

Character	A	B	C	D	E
Frequency	0.4	0.19	0.16	0.15	0.1

- c. Compare DFS and BFS.

UNIT-IV

- 5 a. Write Floyd's algorithm and solve the all pair shortest path problem for the graph shown below



- b. Write algorithm to find transitive closure of a graph and illustrate its working with an example

OR

- 6 a. Write algorithm for memory function knapsack and solve the knapsack instance $n=7, \{w_1, w_2, w_3, w_4, w_5, w_6, w_7\} = \{2, 3, 5, 7, 1, 4, 1\}$ and $\{p_1, p_2, p_3, p_4, p_5, p_6, p_7\} = \{10, 5, 15, 7, 6, 11, 1\}$ and $M=15$ by dynamic programming.
- b. Define transitive closure of a graph.. Apply Warshall's algorithm on the graph defined by following adjacency matrix

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

(3) (3) (3) (10)

UNIT-V

- 7 a. Given a text $txt[0..n-1]$ and a pattern $pat[0..m-1]$, write a function $search(char pat[], char txt[])$ that prints all occurrences of $pat[]$ in $txt[]$. You may assume that $n > m$. (where n is no of characters in the text and m is the no of characters in the pattern).

Input: $txt[] = \text{"THIS IS A TEST TEXT"}$
 $pat[] = \text{"TEST"}$

- b. Solve the job assignment problem using branch and bound methodology.

9	2	7	8	person a
6	4	3	7	person b
5	8	1	8	person c
7	6	9	4	person d

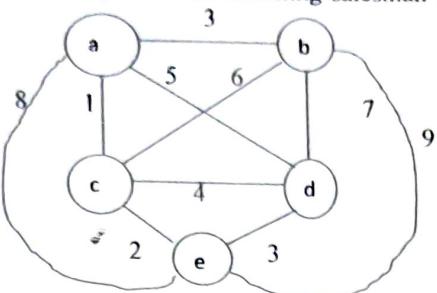
(3) (5) (3) (10)
L CO PO

OR

- 8 a. Apply backtracking to the following sum of subsets problem instance and find all the solutions by constructing the state space tree.
 $S=\{3, 2, 6, 4, 1\}$ $d=7$

(3) (5) (3) (10)

In the help of a state space tree, solve the travelling salesman problem using branch and bound technique.



(3) (5) (3) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)