

**MCA (SEM-III) EXAMINATIONS 2017**  
**Database Management System with Oracle based programming**

Time: 2 Hours

Max Marks: 75

- Write your Roll No. on the top immediately on receipt of the question paper.
- Attempt ALL questions by selecting any TWO parts. All questions carry equal marks.

1.
  - (a) What are the various categories of data models?
  - (b) What are the different database utilities? Describe three new-age databases.
  - (c) Explain the three-layered data architecture. What are the types of metadata?
2.
  - (a) Define the following terms: database schema, database state, DDL, DML, SDL, VDL and query language.
  - (b) What are the various types of attributes found in databases?
  - (c) List the different combinations of disjointness and completeness constraints with an example of each. Explain the meaning of each combination.
3.
  - (a) Explain with example the concept of a subclass and superclass.
  - (b) Explain the concept of the 'Project' and 'Rename' clauses with a suitable example.
  - (c)
    - i) In the Employee database with attributes ename, salary, department, designation. Give the Relational Algebra solution for the following query: Select the tuples for all employees who either work in department 4 and make over \$25000 per year or work in department 5 and make over \$30000 per year.
    - ii) Explain if UNION, INTERSECTION and DIFFERENCE are commutative and associative?
4.
  - (a)
    - i) Explain the check and foreign key constraints in ORACLE.
    - ii) What are cursors in Oracle?
  - (b) Give solution for the following SQL queries:
    - i) In the supplier database with attributes name, address, city, pincode. Select supplier name, address, city, pincode from supplier master where supplier name is either 'Anand' or 'Raman'.
    - ii) In the client master database with attributes client\_no, name, order\_no, bal\_due. Retrieve the client\_no, name from the table client\_master where the value in the bal\_due field is greater than 15000.
    - iii) Write a PL/SQL code block to reverse a given string of four digits '6789'.
  - (c) Explain how the GROUP BY clause works? What is the difference between WHERE and HAVING clauses?
5.
  - (a) What is Normalization? How does it help in removing insertion, deletion and update anomalies?
  - (b) Draw a state diagram and discuss the typical states that a transaction goes through during its execution.
  - (c) Discuss the purpose of Boyce-Codd normal form and describe how BCNF differs from and is stronger than 3NF.

CSCC33

Roll No. 14

**MCA (SEM-III) EXAMINATIONS – 2017**  
**CSCC33: Software Engineering with Minor Project**

**Time: 2 Hours**

**Max Marks: 75**

- Write your Roll No. on the top immediately on receipt of the question paper.
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Q.1.a. List out and explain the Software Characteristics. In the context of software development, compare and contrast the term “Engineering” and “Manufacturing”.

b. What are practitioner’s myths? It is claimed that “the only deliverable for a successful project is the working program” is a myth. Then explain the reality and list out the list of elements to be the part of deliverables, with justification(s).

c. What do you understand by Software Engineering – A Layered Technology?

Q.2. a. Discuss the classic life cycle, its advantages and disadvantages. What is the objective of prototyping and its types? What ways prototyping can improve the performance of Life Cycle?

b. Define basic features of Component-Based Model. What ways is it different with the classical software Development process?

c. Compare RAD and SCRUM Models in terms of the situations in which you recommend them to be used of software development process.

Q.3. a. Draw a block diagram of Development Phase (Excluding Definition and Maintenance Phases) and explain briefly the documents generated during this particular phase.

b. What do you mean by Structured Programming? How is it useful for the purpose of designing software?

c. Explain the purpose of E-R Diagram and Data-Flow Diagram. State their significance with examples. What will happen if we do not use these two diagrams in the Software Development?

Q.4.a. What do you understand by Idealized Software Cycle in the light of “Element of Software Science” by M H Halstead? Define Basic properties in this context.

b. What are the Indicators of Metrics and Measurements of Software? How many Empirical Estimation Models have you gone through? What are the Findings of the studies of these Empirical Models?

c. Compare COCOMO model with Function Point Model. What way they are different? State their individual applicability and their success with justifications.

Q.5. a. Discuss the objective and importance of testing explaining the terms such as Black Box Testing and White Box Testing.

b. Define John McCabe’s Cyclomatic Complexity. What is its impact on testing of software?

c. Explain the difference between Software Quality Assurance (SQA) and Software Quality Control (SQC)? Illustrate with examples.

**MCA (SEM-III) EXAMINATIONS – 2017**  
**CSCC34: Analysis and Design of Algorithms**

**Time: 2 Hours****Max Marks: 75**

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1.

- Explain big O (O), theta ( $\theta$ ), big Omega ( $\Omega$ ) small omega and small o complexity notations with the help of examples. Show graphically as well.
- Briefly explain divide and conquer approach. Write recursive algorithm for merge sort and determine its time complexity.
- Write a recursive algorithm for quick sort using divide and conquer approach. Demonstrate its working step by step by sorting the following array:  
17 10 12 15 13 15 18.

2.

- Explain longest common subsequence problem with reference to any example or DNA comparing. Using dynamic programming approach write an algorithm for it.
- Explain the steps used to solve optimization problems. State the principal of optimality with an example.
- Differentiate between dynamic programming and divide & conquer techniques taking binomial coefficient algorithm as example.

3.

- Explain Kruskal's Algorithm for finding Minimum Spanning Tree. Illustrate it with the help of an example.
- Explain server scheduling algorithm using greedy approach. Find an optimal order for scheduling the following jobs.

Job:	J1	J2	J3	J4	J5	J6	J7	J8	J9
Profit:	80	70	60	50	20	75	65	85	45
Deadline :	3	2	1	4	7	5	2	3	5

- Explain Huffman's encoding. Find an optimal binary code by constructing a binary tree for the following data:

Letters	:	a	b	c	d	e	f
Frequency	:	45	13	12	16	09	05

4.

- Solve using backtracking technique the sum of subsets problem when  $n=4, W=13$  and  $w_1=3, w_2=4, w_3=5$  and  $w_4=6$ .
- Explain with the help of example how backtracking can be used to solve the 0/1 knapsack problem.
- Explain with the help of example the difference between backtracking and branch and bound technique.

5.

- Suppose we have the instance of the 0-1 knapsack problem with  $n=4, W=16$  and

$P_i$	$w_i$	$P_i/w_i$
40	2	20
30	5	6
50	10	5
10	5	2

With the help of best first search branch and bound pruning draw the state space tree and find the optimal profit.

- Explain how travelling sales person problem can be solved with the help of branch and bound technique.
- Explain P, NP, NP complete and NP Hard problems. Also show relation between them.

**MCA (3<sup>rd</sup> semester) EXAMINATIONS – 2017**  
Scientific and Statistical Techniques Using FORTRAN/ R

Time: 2 Hours

Max Marks: 75

- Write your Roll No. on the top immediately on receipt of the question paper.
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- Solve the following system of linear algebraic equations using Gauss elimination method.  
 $2X_1 + X_2 + X_3 = 10$   
 $3X_1 + 2X_2 + 3X_3 = 18$   
 $X_1 + 4X_2 + 9X_3 = 16$
  - Derive the formula for Regular False method and find cube root of 47 using the same method.
  - Write a program in FORTRAN to implement any one of the above problems.
- A table of a polynomial function is given below. Find the F(2.5) using any method.

X	-3	-1	0	3	5
F(x)	-30	-22	-12	330	3458

- Derive formula for Simpson 3/8<sup>th</sup> Rule. Trap. simp.
- Solve the following Integral by dividing the range into six equal part using any appropriate method:-

$$\int_0^{\pi} \sin x \, dx$$

- Explain the following with the help of suitable examples:-
    - Arithmetic Mean, Geometric Mean and Harmonic Mean
    - Coefficient of Variation and Variation
  - Marks obtained by nine students of a college in Botany and Zoology are given below.

Botany	35	23	47	17	10	43	09	06	28
Zoology	30	33	45	23	08	49	12	04	31

Calculate Spearman's Coefficient of rank correlation and interpret.

- Find the Mean, Median and Mode of the numbers given below:-  
4, 3, 2, 5, 3, 4, 5, 1, 7, 3, 2, 1

- Define conditional probability. A bag contains 5 white and 3 black balls. Two balls are drawn at random one after another without replacement. Find the probability that both the balls drawn are black.  $\frac{2}{8} \times$

- Explain the following terms with the help of examples:-
  - Sample space, event and equally likely event
  - Addition and multiplication of probabilities.
- Write a program in FORTRAN to implement Mean, Standard Deviation and Correlation.

- Applications of fertilizers were tested for the yield of rice grown in 10 plots. Another seed of 10 plots of similar size & condition were taken as control. Apply t-test to test the effect of fertilizer. It is given that the critical value=2.10.

Plot No.:	1	2	3	4	5	6	7	8	9	10
Fertilizer Applied	16	14	18	15	13	17	16	15	14	13
Fertilizer not applied	10	12	11	9	13	13	12	14	13	11

- Write a Program in Fortran to implement the above problem.

- Two samples were drawn normal population of a district town & their values are

A:	66	67	82	75	76	90	92	88	84		
B:	66	64	78	74	87	85	82	95	93	97	92

Test whether the two populations have the same variance at 5% level of significance. It is given that the critical value= 3.35.

7.64

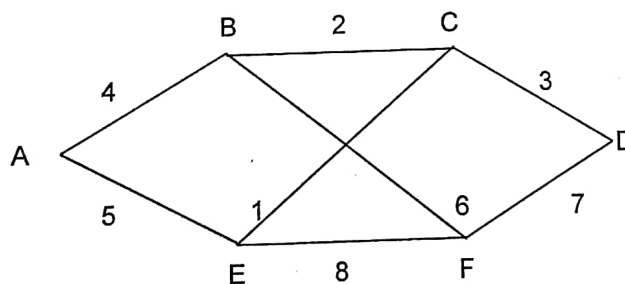
**MCA (SEM-III) EXAMINATIONS - 2017**  
**Computer Networks and System Administration**

Time: 2 Hours

Max Marks: 75

- Write your Roll No. on the top immediately on receipt of the question paper.
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- Briefly explain the types of addresses (identifiers) used in each of the following layers: application layer, network layer and data-link layer.
  - Illustrate the Fiber-Optic cabling system along with its propagation modes, performance, advantages and disadvantages.
  - Differentiate between OSI reference model and TCP/IP reference model.
- Given the dataword 101001111 and the divisor 10111, show the generation of the CRC codeword at the sender site (using binary division).
  - Compare and contrast byte-stuffing and bit-stuffing with suitable examples.
  - Assume PPP (Point-to-Point Protocol) is in the established phase; show payload encapsulated in the frame.
- An organization is granted a block of addresses with the beginning address 14.24.74.0/24. The organization needs to have 3 subblocks of addresses to use in its three subnets as: One subblock of 120 addresses, One subblock of 60 addresses, and One subblock of 10 addresses. Design the subblocks and find out how many addresses are still available after these allocations.
  - Consider the subnet given below. Distance vector routing is used, and the following vectors have just come in to router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and from E: (7, 6, 3, 9, 0, 4). The measured delays to B, D, and E, are 6, 3, and 5, respectively. What is C's new routing table? Give both the outgoing line to use and the expected delay.



- Illustrate leaky bucket algorithm for congestion control in network layer.

4. (a) A window holds bytes 2001 to 5000. The next byte to be sent is 3001. Draw a figure to show the situation of the window after the following two events.
- An ACK segment with the acknowledgment number 2500 and window size advertisement 4000 is received.
  - A segment carrying 1,000 bytes is sent.
- (b) TCP opens a connection using an initial sequence number (ISN) of 14,534. The other party opens the connection with an ISN of 21,732.
- Show the three TCP segments during the connection establishment.
  - Show the contents of the segments during the data transmission if the initiator sends a segment containing the message "Hello dear customer" and the other party answers with a segment containing "Hi there seller."
  - Show the contents of the segments during the connection termination.
- (c) Illustrate MIME headers that can be added to the original e-mail header to define the transformation parameters.
5. (a) Discuss three forms of fault tolerance that are common on networks and servers.
- (b) Provide a naming conventions scheme for accounts and passwords that can work with dozen of servers and hundreds or thousands of users.
- (c) A DNS client is looking for the IP address of jmi.ac.in. Show the query and response messages with values for each field.

**CBCS for PG (SEM-III) Examination, 2017**  
**Problem Solving using Java Programming**

**Max Marks: 75**

**Time: 2 Hours**

- Write your Roll No. on the top immediately on receipt of the question paper.
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1. (a) What are different editions of Java? Differentiate among desktop-based applications, web-based applications and Applets
  - (b) Explain Java APIs of Big Numbers with suitable example(s). Write a recursive method that computes factorial of any digit number. Also demonstrate working of the method in main program.
  - (c) Distinguish between:
    - i. InputStream and Reader classes
    - ii. OutputStream and Writer classes
- 
2. (a) Explain the concept of method overriding and use of super keyword through a Java program.
  - (b) Explain the role of abstract and wrappers classes in Java with suitable examples.
  - (c) What is Super Cosmic class? Explain the concept of Autoboxing and unboxing with suitable examples
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3. (a) What do you mean by Immutable String? How does ~~it differ~~ <sup>String Buffer</sup> from string class? Explain the purpose of *StringBuilder* class through a suitable example.
  - (b) Explain the need of exception handling in Java. Write a program to handle user-defined exception "Marks out of bound". The exception is fired if marks > 100.
  - (c) What do you mean by Generic Programming? Write a generic method swap() to swap the values of generic type.
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4. (a) Define a class *Triangle* to store all the three sides of a triangle with necessary setters and getters. Write a Java program which creates 10 objects of Triangle and store it to an appropriate type of collection.
  - (b) Explain multithreading concept in Java. Write a Program showing multiple threads working upon single object using synchronized keyword.
  - (c) Explain how threads are created in Java. Write a program to create two threads, first thread will print odd numbers and second thread will print even numbers between 1 to 10 numbers.
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5. (a) Write a program in Java to create a GUI for web-based user registration form using swings.
  - (b) What is JDBC? What are the steps involved in establishment of a JDBC connection? Explain the Resultset types and Resultset constants in brief.
  - (c) Explain with an example how events can be handled in Java. Write a Java program to demonstrate any three Mouse Events.