

(2021 Batch onwards)

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St Aloysius College (Autonomous)

Mangaluru

B.C.A. Semester V – Degree Examination

October/November - 2025

DESIGN AND ANALYSIS OF ALGORITHMS

Time: 2 ½ Hours.

Max Marks: 60

PART – A

1. Answer any **SIX** of the following.

(6x2=12)

- Calculate the space complexity of a function that sums elements of an array.
- Find the time complexity of nested loop:
for i in range(n):
 for j in range(n):
 print(i, j)
- What is the principle of optimality?
- Which conditions must be satisfied while placing queens in the 8 queens' problem?
- State the time complexity of Job Sequencing with Deadline using Greedy strategy.
- Define multistage graph problem and give one real-life application of multistage graph problem.
- Why is the brute force convex hull algorithm is used?
- Why is Insertion Sort considered efficient for small input sizes?

PART – B

Answer any **ONE FULL** question from each unit.

(4x12=48)

UNIT – I

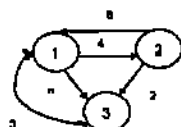
- Define best-case, worst-case, and average-case efficiencies of an algorithm. Explain each with a suitable example. (6)
 - Let $f(n)=6*2n+n^2$. Express $f(n)$ using Big-Oh and Big-Omega. (6)
- Explain the various stages of algorithm design and analysis process. (6)
 - List and explain different problem types of algorithms. (6)

UNIT – II

- Write and explain the steps of the brute force algorithm to find the closest pair among n points in a plane. (6)
 - Solve the following instance of 0/1 Knapsack problem using dynamic programming. The weight of the knapsack is 8 kg. The number of items is 4. Weights: {3, 4, 6, 5} Profits: {2, 3, 1, 4} (6)
- Find the minimum cost for the following graph using the all pairs shortest path. (6)

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- Write an selection sort algorithm and derive the time complexity. (6)

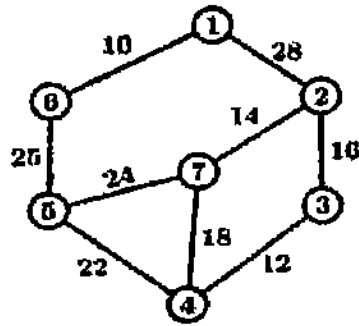
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UNIT - III

- 6. a) Explain the Binary Search Algorithm and write the code for it. (6)
- b) Write an merge sort algorithm and sort the following using merge sort (6)
 12,8,9,3,11,5,4
- 7. a) Write Quick sort algorithm and derive its time complexity. (6)
- b) What is Strassen's matrix multiplication? Briefly explain and obtain its (6)
 time complexity.

UNIT - IV

- 8. a) Define minimum cost spanning tree. Obtain a minimum cost spanning tree for the given graph using Kruskal's Algorithm.



(6)

- b) Explain 4-Queen's problem by using backtracking approach. (6)

(6)

- 9. a) Apply Prim's algorithm to obtain a minimum cost spanning tree for the given graph.



(6)

- b) Construct a Huffman tree and the resulting code for the following :

- i. Encode the text ABACABAD
- ii. Decode the text 100010111001010

Character	A	B	C	D	E
Frequency	24	12	10	8	8

(6)

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B.C.A. Semester V – Degree Examination

October/November - 2025

STATISTICAL COMPUTING AND R PROGRAMMING

Max Marks: 60

Time: 2 ½ Hours.

PART –A

(6x2=12)

1. Answer any **SIX** of the following.

- List the different data types available in R.
- Mention any two special values with its significance.
- What is the R code to calculate inter quartile range?
- How does a list differ from a vector?
- What is the purpose of `lm()` function in R? What arguments does this function takes?
- Write a R code to find the largest and smallest of the following elements.
12, 22, 4, 67, 100, 4
- What is the significance of α (alpha) and p-value in hypothesis testing.
- Mention any two continuous probability distributions.

PART –B

Answer any **ONE FULL** question from each unit.

(4x12=48)

UNIT – I

2. a) What is data frame? How do you create data frame in R language?

Write an example to

- Add a new column to the existing data frame.
- Subset a data frame based on the condition.

(6)

b) Explain the following functions with examples for each.

- `rep()`
- `typeof()`
- `class()`

(6)

3. a) What are the different ways of creating vectors? Explain with examples.

(6)

b) What is the significance of `cbind()` and `rbind()` functions? Explain with examples.

(6)

UNIT – II

4. a) How do you read the data using

- `scan()`
- `readline()` functions?

Explain in detail with examples.

(6)

b) Explain the different conditional statements in R Language.

(6)

5. a) How to handle exception in R Code? Explain with example.

(6)

b) What is a function? What are the advantages of it? Define and invoke a R function to add two numbers and return the sum.

(6)

Contd...2

UNIT – III

6. a) Define binomial distribution. Write the formula to find the probability mass function of binomial distribution. Write the R code to implement the formula without using built in function. Which of the R language function replace the same? (6)
- b) A problem in mathematics is given to two students A and B whose chances of solving it are $\frac{1}{2}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved if all of them try independently? Write the R code to implement the same. (6)
7. a) Find the standard deviation for the following data regarding daily sales of pressure cookers in a shop.

no of cookers	12	13	14	15	16	17	18	19
no of days	1	0	4	12	20	15	6	2

(6)

Implement the above problem in R script.

- b) The age of the twenty students enrolled for the Computer Science course are
18, 19, 19, 19, 19, 20, 20, 20, 20, 20, 21, 21, 21, 21, 22, 23, 24, 27, 30, 36
1. Calculate the mean age.
 2. Write the R script to calculate the mean age without using direct built-in function.
 3. Write the R script to find the mode.

(6)

UNIT – IV

8. a) What is the statistical decision of Hypothesis Testing? Explain in detail. Write any two statistical tests used for Hypothesis Testing. (6)
- b) Write a note on Correlation. How to find correlation matrix using R Script? (6)
9. a) Explain the different methods of visualizing the data with the R syntax. (6)
- b) Calculate the regression equation X on Y for the data given below.

Price (Rs)	10	12	13	12	16	15
Amount demanded	40	38	43	45	37	43

Also write the R-code to fit a linear regression model and predict the likely demand. When price is ₹ 30.

(6)

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SOFTWARE ENGINEERING

Max Marks: 60

Time: 2 ½ Hours.

PART -A

1. **Answer any SIX of the following.**

(6x2=12)

- What is requirement engineering?
- What is SRS?
- What is waterfall model?
- What is verification?
- Define system design.
- Mention one purpose of monitoring in design.
- What is the main objective of debugging?
- What is static testing?

PART -B

Answer any ONE FULL question from each unit.

(4x12=48)

UNIT - I

- Explain software engineering process characteristics. **(6)**
 - What are the characteristics of good software? Explain any four. **(6)**
- Discuss SRS validation. Why is it important? **(6)**
 - Describe three key characteristics that differentiate system software from application software. **(6)**

UNIT - II

- Explain the process involved in SQA. **(6)**
 - What is the Capability Maturity Model (CMM)? Describe its levels and their significance in software quality. **(6)**
- Explain the concept of the State Machine Model. **(6)**
 - Draw a class diagram for hospital management system. **(6)**

UNIT - III

- What do you mean by cohesion? Explain different types of cohesion. **(6)**
 - Explain any two approaches of integration testing. **(6)**
- What do you mean by coupling? Explain different types of coupling. **(6)**
 - Describe the process and importance of test plan creation in software projects. **(6)**

UNIT - IV

- Differentiate code walkthrough and code inspection. **(6)**
 - Describe what software version control is and how it benefits a software development team. **(6)**
- Explain the different categories of software maintenance. **(6)**
 - Differentiate between an error, a fault and a failure in the context of software development. **(6)**

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B.C.A. Semester V – Degree Examination

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CLOUD COMPUTING

Time: 2 ½ Hours.

Max Marks: 60

PART – A

1. **Answer any SIX of the following.** (6x2=12)
- Mention different ways of connecting to the cloud.
 - Describe the terms modular and stateless in composability.
 - Expand PCI-DSS.
 - Describe the term of the acronym FCAPS.
 - What is Storage virtualization?
 - Why is the encryption important in cloud storage?
 - What is the purpose of Amazon CloudWatch?
 - Define abstraction In the context of cloud computing.

PART – B

Answer any ONE FULL question from each unit. (4x12=48)

UNIT – I

- Discuss the role of infrastructure, platforms, and applications in cloud architecture. (6)
- Write a note on virtual appliances with examples. (6)
- a) What is the role of HTTPS and SSH in cloud communication? (6)
b) With neat diagram explain NIST model with its key components. (6)

UNIT – II

- Explain Cloud management standards. (6)
b) What is cloud stack explain CSA reference model. (6)
- a) Write a note on DMTF and SMI. (6)
b) Explain the Identity protocol standards in cloud computing. (6)

UNIT – III

- Explain Virtualization Reference model with neat diagram (6)
b) What are the advantages and disadvantages of virtualization in cloud computing? (6)

- a) Differentiate between CDMI and OCCI (6)
b) Explain 3-2-1 backup-rule. (6)

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UNIT – IV

- a) Explain applications of cloud computing in the field of health care. (6)
b) What are the impact of cloud computing on satellite image processing? (6)
- a) Explain the features of google app engine. (6)
b) Write a note on various applications of cloud computing. (6)

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DIGITAL MARKETING

Time: 2 ½ Hours.

Max Marks: 60

PART – A

1. Answer any **SIX** of the following. (6x2=12)

- a) Define digital landscape.
- b) What is Digital Marketing?
- c) What is social media content calendar?
- d) Mention any two advantages of Digital Marketing.
- e) What is Email unsubscribe Rate? How it is calculated?
- f) What is Email automation?
- g) What is AdWords? Mention two features.
- h) Give two benefits of social media marketing.

PART – B

Answer any **ONE FULL** question from each unit. (4x12=48)

UNIT – I

2. a) Differentiate between behavioral and demographic marketing segmentation? (6)
b) Explain P-O-E-M framework In digital marketing with example. (6)
3. a) Explain the key features of Internet banking. (6)
b) What is EDI? Describe the applications of EDI. (6)

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UNIT – II

4. a) Explain the different types of social media advertising in detail. (6)
b) Explain the different methods of social media analytics. (6)
5. a) Explain the disadvantages of social media marketing. (6)
b) Explain the steps to optimize social media profile. (6)

UNIT – III

6. a) What is meant by mobile advertising? Explain different forms of mobile advertising. (6)
b) What is E-mail marketing? Explain the benefits of E-mail marketing. (6)
7. a) What is content creation? Mention some content creation tools. Explain the feature of any two tools. (6)
b) Explain in detail different context marketing strategies. (6)

UNIT – IV

8. a) What is meant by Website Ranking? Explain any five factors influencing the website ranking. (6)
b) What is meant by basic keyword search? What are the different steps of basic keyword search? (6)
9. a) Explain the three components of SEO in detail. (6)
b) What do you mean by a) CPC b) CPM c) CPL (6)
