

Design And Analysis of AlgorithmInstructions:

- 1) All questions are compulsory.
- 2) Mixing of sub questions is not allowed.
- 3) Write in clear, legible, writing.

Q1) Attempt any four:

(20)

- A) Explain asymptotic notations? Explain best, worst and average case notations
- B) What is a STACK? Different Operations on Stack.
- C) What is the postfix expression for the corresponding infix expression? Solve using Stack. $a+b*c+(d*e)$
- D) Write a program in python to find sum of rows and columns of 3 d array
- E) What is data structure? explain types of data structures.
- F) Short note on the following: **(ATTEMPT ANY TWO)**
 - i. Rate Of Growth
 - ii. Asymptotic Analysis
 - iii. List Data Structure
 - iv. Time & Space Complexity

Q2) Attempt any four:

(20)

- A) What is recursion? Differentiate between recursion and iteration?
- B) Briefly explain sorting techniques
- C) Write a program of a factorial number using iteration and recursion?
- D) Consider the following array A-

8	3	2	7	9	1	4
---	---	---	---	---	---	---

 and implement the above through the **BUBBLE SORT** algorithm on this array.
- E) Differentiate between
 - a. Selection sort and INSERTION sort
 - b. Linear Search and Binary search
- F) Short note on the following: **(ATTEMPT ANY TWO)**
 - a. Quick select
 - b. Naive Algorithm
 - c. iteration

Q3) Attempt any four:

(20)

- A) Introduction of various types of algorithm techniques?
- B) Briefly explain about the divide and conquer approach?
- C) What is greedy technique along with its advantages, disadvantages and application?
- D) Explain the longest common subsequence dynamic approach?
- E) Briefly explain placing 4 queens on 4x4 chessboards such that no 2 queens attack each other and find out the best two solutions for that?
- F) Briefly explain quick sort techniques with examples?

Q4) Attempt any five:

(15)

- A) Briefly explain dynamic programming approach
- B) Explain Asymptotic Notation.
- C) Write a program of Bubble sort using recursion?
- D) Write a program for 2d matrix multiplication
- E) Consider the following array A- [65,85,14,2,5,32,12,5,8,4,11]

and find out 32 from the above list through the **Binary search**.

F) . What is a Back-Tracking programming approach?

Advanced Python Programming**Instructions:**

- 1) All questions are compulsory.
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 - 3) Write in clear, legible, writing.
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Q1) Attempt any four: (20)

- A) What is file? How to open a file? How to close a file? Explain with examples.
- B) Explain 'with' statement with example.
- C) Explain zipping and unzipping of files.
- D) What is regular expression? Explain Various Method of Regex.
- E) Explain the sequence characters of regular expression with example.
- F) What is the difference between process and thread?

Q2) Attempt any four: (20)

- A) How to connect SQL server explain with an Example.
- B) What is cursor? Explain it with example.
- C) How to retrieve rows from a table.
- D) What is protocol? Explain Different types of protocol.
- E) Explain client server architecture.
- F) Explain types of client server architecture.

Q3) Attempt any four: (20)

- A) What is encapsulation? Explain with example
- B) What is abstraction? Explain with example
- C) Explain inheritance with example
- D) What is polymorphism? Explain with example
- E) Explain with example constructor and destructor
- F) What is inheritance? Explain with example.

Q4) Attempt any five: (15)

- A) Explain formal interface with example.
- B) Explain informal interface with example.
- C) With the help of proper example explain radiobutton widget in tkinter module
- D) Write a python GUI that contains three radiobuttons for color "Red", "Green" and "Blue". Display selected color on a label.
- E) Write short note on timedelta?
- F) Explain with example how to compare two dates.

Introduction to OOPS Using C++

12/4/23

Instructions:

- 1) All questions are compulsory.
- 2) Mixing of sub questions is not allowed.
- 3) Write in clear, legible, writing.

Q1) Attempt any four:

(20)

- A) Explain logical operators in C++ with examples.
- B) Explain switch case structure in C++ with an example.
- C) Explain various data types and qualifiers in C++.
- D) Write a program in C++ to print tables from 13 to 19 and each table till five times.
- E) Write a program to reverse a number taken from the user.
- F) Write a program in C++ to input an integer containing only 0s and 1s (i.e., a "binary" integer) and print its decimal equivalent. Do not use any conversion functions.

Q2) Attempt any four:

(20)

- A) Explain the difference between call by reference and call by value.
- B) Explain static class members with examples.
- C) Explain friend function.
- D) Create a class to represent a complex number. Define appropriate constructor. Overload the operators for dividing two complex numbers. Create objects in the main and demonstrate the operation.
- E) Write a program in C++ to create a class named Stock that stores the stock's symbol, the stock's name, the stock price for the previous day, the stock price for the current time. Define a constructor that creates a stock with the appropriate values, a method named getChangePercent() that returns the percentage changed from stock price for the previous day to the stock price for the current time.
- F) Write a program in C++ to create a class named Account that stores id for the account, balance for the account, the current interest rate, the date when the account was created. Define a constructor that creates an account with the specified id and initial balance. Define a method named withdraw that withdraws a specified amount from the account, a method named deposit that deposits a specified amount to the account.

Q3) Attempt any four:

(20)

- A) Explain the various ways in which a class can be inherited and their implications.
- B) Explain the need of pure virtual functions with examples.
- C) Explain with examples the order of constructor and destructor calls in inheritance.
- D) Explain how inheritance is implemented in C++ with an example.
- E) Explain how dynamic polymorphism is implemented in C++ with examples.
- F) Explain clearly the difference between method overloading and method overriding.

Q4) Attempt any five:

(15)

- A) Explain the three bitwise operators in C++ with examples.
- B) Explain copy constructor in C++ with examples.
- C) Explain the need of virtual functions with examples.
- D) Explain how you create a pointer to an object and use it to access the class members.
- E) Explain the various inheritance allowed in C++.
- F) Explain how you open a file in C++ and read its contents.

Instructions:

- 1) All questions are compulsory.
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- 3) Write in clear and legible writing.

- Q.1 Attempt any FOUR (20)**
- A) What are the different types of database system users?
 - B) What is DBMS? What are the characteristics of DBMS?
 - C) What is key? What are the different types of keys available in DBMS explain?
 - D) Explain the term Aggregation.
 - E) Explain the terms
 - i) Stored attribute
 - ii) Derived attribute
 - iii) Key attribute
 - F) Explain CREATE and DROP command with suitable example.
- Q.2 Attempt any FOUR (20)**
- A) Explain domain relation constraints in detail.
 - B) Explain concept of JOIN operation in Relational algebra.
 - C) Write a note on Cartesian product.
 - D) Explain various Math functions in MySQL.
 - E) What is correlated sub query? Explain with example.
 - F) Describe various operator for multiple sub query.
- Q.3 Attempt any FOUR (20)**
- A) Write a short note on Functional Dependencies.
 - B) List the Armstrong Axioms for Functional Dependencies.
 - C) Consider relation $R=(A,B,C,D,E,F)$ having set of FD's
 $A \rightarrow B$, $A \rightarrow C$, $BC \rightarrow D$, $B \rightarrow E$, $BC \rightarrow F$, $AC \rightarrow F$
 Calculate some members of Axioms as given
 i) $A \rightarrow E$ ii) $BC \rightarrow DF$ iii) $AC \rightarrow D$ iv) $AC \rightarrow DF$
 - D) Explain 1NF and 2NF in detail.
 - E) Explain COMMIT and ROLLBACK command in detail.
 - F) Explain the primary, secondary index in detail.
- Q.4 Attempt any FIVE (15)**
- A) Explain RENAME and DESC command with suitable example.
 - B) Explain INSERT and UPDATE command with suitable example.
 - C) Explain Aggregate functions in detail.
 - D) Explain various operators available in Relational algebra.
 - E) Explain Outer JOIN in detail.
 - F) Write a note on BCNF.

Max Time: 2½ hrs

FYCS Semester II

Max Marks: 75

CALCULUS

19/4/23

Instructions:

1. All questions are compulsory.
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3. Write in clear, legible, writing.

Q1) Attempt any four: (20)

- A. if $f(x) = 4x + 7, \quad x < 3$
 $= x^2 + 3x + 1, \quad x \geq 3$; at $x=3$, then find f is differentiable or not?
- B. Find the interval in which the function $f(x) = x^3 - 27x + 5$ is increasing or decreasing.
- C. A rectangular sheet of paper has the area 24 sq. meter. the margin at the top and bottom is 75 Cm and 50 cm each. What are the dimension of the papers is maximum?
- D. Determine relative extrema of the functions $f(x) = x^4 - x^3$
- E. Determine the absolute extrema for the following functions $f(x) = x^2 - 4x$ in $[0,2]$
- F. Draw the graph of $y = 4 - 3x^2 + x^3$.

Q2) Attempt any four: (20)

- A. Solve the give integration by parts $y = \int x \sin(2x) dx$
- B. Solve the differential equation by separation of variables $\sqrt{1-y^2} dx + \sqrt{1-x^2} dy = 0$
- C. solve the given definite integrals using substitution method $y = \int_{-1}^5 (1+t)(2t+t^2) dt$
- D. Find the length of area of the curve $y = \frac{1}{6} x^5 + \frac{1}{2} x^{-1}$ from $x=1$ to $x=2$.
- E. Use Simpson's rule with $n=4$ to estimate $\int_0^4 x^2 dx$.
- F. solve the given integration using substitution method $y = \int \frac{\tan^4 \sqrt{x} \sec^4 \sqrt{x}}{\sqrt{x}} dx$

Q3) Attempt any four: (20)

- A. Find all second order partial derivative of f . also verify $f_{xy} = f_{yx}$ at any (x,y)
 For each $f. f(x,y) = x^4 + 7x^2y^3 - 5x^3y^2 + y^4$.
- B. Find $f'(u,v)$ for each $f(x,y), f(x,y) = ye^x - x \cos y$, at $u = (0, \pi/2), \bar{v} = \bar{i} + 3\bar{j}$
- C. find the gradient vector of $f(x,y)$ where $f(x,y) = x^2y + y^2z + z^2x$ at $(1,2,3)$
- D. Using definition find f_x, f_y at $(0,0)$ for the following function
 $f(x,y) = \frac{y^3+4x}{y}, f(x,0)=0$ for all x
- E. Find all local maxima and local minima of the function f where
 $f(x,y) = x^3 + 2y^3 - 3x^2 - 24y + 16$
- F. Find the linearization of $f(x,y) = y \cos x + x \sin y$ at $(\frac{\pi}{2}, \pi)$

Q4) Attempt any five: (15)

- A. Divide the number 100 into two parts such that their product is maximum.
- B. if $f(x) = 8x - 5, \quad x \leq 2$
 $= 3x^2 - 4x + 7, \quad x > 2$; at $x=2$, then find f is differentiable or not?

E-Commerce and Digital MarketingInstructions:

- 1) All questions are **compulsory**.
 - 2) Mixing of sub questions is not allowed.
 - 3) Write in clear, legible, writing.
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Q1) Attempt any four:

(20)

- A) Explain stages of planning a digital marketing strategy.
- B) Write a note on C2B and C2C.
- C) Explain opportunities in E-Commerce.
- D) What is EPS? Write its types.
- E) Define E-commerce. Explain the history of E-commerce.
- F) Distinguish between E-commerce Vs M-commerce

Q2) Attempt any four:

(20)

- A) Write Economics & Social Impact of E-Business
- B) What is E-Commerce? Write its Advantages?
- C) What is the Facebook Business page?
- D) Write a Note on B2B and B2C.
- E) Explain the working of Ecash.
- F) Write a note on the P-O-E-M Framework.

Q3) Attempt any four:

(20)

- A) Explain social media with its types.
- B) Explain Youtube marketing.
- C) Explain Framing LinkedIn Strategy.
- D) Explain types of Blog-Post.
- E) What are the email marketing tools?
- F) Explain the types of mobile marketing.

Q4) Attempt any five:

(15)

- A) What is search Engine optimization? Explain its different types.
- B) Explain the introduction to SEO in detail and state its benefits.
- C) Explain Web Analytics process.
- D) Explain objectives of Web analytics.
- E) Explain the challenges of content marketing.
- F) Explain the reports and analytics of google analytics..

Max Time: 2½ hrs

FYCS Semester II

Max Marks: 75

SM

Instructions:

1. All questions are compulsory.
2. Mixing of sub questions is not allowed.
3. Write in clear, legible, writing.

Q1) Attempt any four:

(20)

- A. Let X be continuous random variable with p.d.f.
- $$f(x) = kxe^{-x} \quad x \geq 0$$
- $$= 0 \quad \text{otherwise}$$
- Find i) k ii) mean iii) Standard deviation
- B. Let X denotes the number of computers sold, and suppose that the pmf of X is P(X=0)= 0.1; P(X=1)= 0.2; P(X=2)=0.3; P(X=3)=0.4.
- i) find mean and variance.
 - ii) the profit is a function of the number of computers sold: h(x)=800X-90. what are the variance and SD of the profit h(X)?
- C. Vijay has started new retail outlet in mid of the market. In market there is business and competition. Therefore survival of a new outlet is very rare chance of survival is almost 5%. Vijay has started such 7 new retail outlet. Find out the probability that:
- 1) At least 3 shops will survive.
 - 2) exactly 5 shops will survive.
- D. The weight of adult goat is normally distributed with a mean 25 kg and a standard deviation 3 kg. select a goat randomly. Find the probability that the goat's weight is
- (a) less than 23 kg.
 - (b) between 20kg and 27kg
 - (c) more than 29kg.
- (given $P(0 < Z < 0.67) = 0.2514$, $P(0 < Z < 1.67) = 0.4525$, $P(0 < z < 1.33) = 0.4082$)
- E. Write the properties of F distribution
- F. Write the properties of t-Distribution.

Q2) Attempt any four:

(20)

- A. In the population, IQ scores are normally distributed with a mean of 100. One of the School wants to know if their students have an IQ that is higher than the population mean. They take a random sample of 15 students and find that they have a mean IQ of 109 with a standard deviation of 23. Test at 0.05.
- (use: t test, $t_{(\alpha, n-1)} = 1.761$)
- B. Last season a farmers lost 20% of their crop by an insect pest. This season they uses a pesticide to reduce this problem. Right before harvest random sample of 60 fields are chosen for survey and finds insect in 9 fields. Did the pesticide reduce the insect problem at 1% level of significance? ($Z_{\alpha} = 2.33$)
- C. The purchasing director for an industrial parts factory is investigating the possibility of purchasing a new type of milling machine. She determines that the new machine will be bought if there is evidence that the parts produced have a higher average breaking strength than those from the old machine. A sample of 100 parts taken from the old machine indicated a sample mean of 65 kilograms and a sample standard deviation of 10 kilograms, whereas a similar sample of 100 from the new machine indicated a sample mean of 72 kilograms and a sample standard deviation of 9 kilograms. Using the 0.01

level of significance, is there evidence that the purchasing director should buy the new machine? ($Z_{\alpha} = 2.33$)

- D. In a sample of 100 store customers, 43 used a MasterCard. In another sample of 100, 58 used a Visa card. At a 0.05, is there a difference in the proportion of people who use each type of credit card? (critical value=1.96)
- E. A company that manufactures chocolate bars is particularly concerned that the mean of a chocolate bar not be greater than 100 gm ounces. Past experience allows you to assume that the standard deviation is 5 gm. A sample of 60 chocolate bars is selected, and the sample mean is 102 gm. Using the 0.01 level of significance, is there evidence that the population mean weight of the chocolate bars is greater than 100 gm?
(use: z test, $Z_{\alpha} = 2.33$)
- F. Explain one way Analysis of Variance. (20)

Q3) Attempt any four:

- A. A small scale manufacturing company want to know the effect of new machinery installed on defects produced in a lot. A total of $n = 10$ machines were chosen including new and old machines. Quality control managers were ask to record the defects per lot. The data are shown below.

Old machine	7	5	6	4	12
New machine	3	6	4	2	1

Is there is any difference in defects produced by old and new machines.

(hint: Mann Whitney U test, $U_{(0.05, 5, 5)} = 2$)

- B. A study is undertaken to know the impact of proper exercise on blood pressure of a teen age student, Total of 15 students were selected and blood pressure recorded before the commencement of exercise program. Then a proper exercise program was given to these students and again blood pressure was measured after completion of program. Following are the reading. (Hint: Wilcoxon signed rank test)

Student	Blood pressure before exercise program	Blood pressure after exercise program
1	125	118
2	132	134
3	138	130
4	120	124
5	125	105
6	127	130
7	136	130
8	139	132
9	131	123
10	132	128
11	135	126
12	136	140
13	128	135
14	127	126
15	130	132

Check whether exercise significantly improves blood pressure?

- C. Explain Mann Whitney U test.
- D. What is a non-parametric test? What are the situations when one need to use non

E. parametric test?
Differentiate between parametric and non-parametric test.

F. Following is the data related to supporting a particular party and geographical area.

	supported	Not supported	total
Urban	50	30	80
rural	90	100	190
total	140	130	270

Check is there any association between supporting a particular political party and area.

Q4) Attempt any five: (15)

A. Verify whether the following can be p.m.f for the given values of X.
i)

X	2	3	4	5	6
P(X=x)	0.15	0.25	0.2	0.1	0.3

ii)

X	-1	0	1	2	3
P(X=x)	0.2	-0.1	0.3	0.3	0.3

B. Write the properties of Chi square distribution.

C. Suppose that we wanted to calculate the 99% confidence level of the mean weight of bricks where $\bar{x} = 4.07$, $S = 2.3$, and the sample size was 25.
($Z_{\alpha} = 1.7109$)

D. A professor in the accounting department of business school claims that there is much more variability in final exam scores of students taking the introductory accounting course who are not majoring in accounting. Random samples of 13 non accounting majors and 10 accounting majors are taken from the professor's class roster in his large lecture, and the following results are computed based on the final exam scores:

Non - Accounting : $n_1 = 13$, $S_1^2 = 210.2$

Accounting : $n_2 = 13$, $S_2^2 = 210.2$

At the 0.05 level of significance, is there evidence to support professor's claim?

(critical value= 3.07 , use : f test)

E. What is sign test?

F. following is the data related to attendance in a class. Use chi square test to know is there any association between Gender and Absenteeism.

	Boys	Girls
Present	20	30
absent	45	50