Max Time: 2½ hrs | **FYCS Semester II** | Max Marks: 75

Design and Analysis of Algorithm

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 with a diagram what is algorithm? State the characteristics of an algorithm.
b) Justify : Why analysis of algorithm is important?
c) What is complexity? Describe time and space complexity.
d) Explain the stages in analyzing an Algorithm.
e) What are the different types of Algorithms?
f) What is asymptotic notation? List the different types of asymptotic notations.

Q2) Attempt any four: (20)

a) What is recursion? Differentiate between recursion and iteration?
b) Write a program of a factorial number using iteration and recursion?
c) Write a program of a Fibonacci series using recursion?
d) Explain: Tower of Hanoi problem.
e) Briefly explain sorting techniques.
f) Explain Searching techniques in brief.

Q3) Attempt any four: (20)

a) Briefly explain about the divide and conquer approach?
b) Explain Greedy techniques. State its application.
c) Classify algorithm by implementation method.
d) Difference between Top-down and Bottom-up approach.
e) What is Back-Tracking programming approach. State its application.
f) Explain the longest common subsequence dynamic approach?

Q4) Attempt any five: (15)

a) What is the Stack? Describe different operations?
b) Write a short note on: Linked list. Explain its various operations.
c) Write a brief description on Selection sort and INSERTION sort
d) Distinguish between Linear Search and Binary search
e) Briefly explain dynamic programming approach.
f) Write a program illustrating N-Queen problem.

----------xxxxxxxxxxxxxx----------

Max Time: 2½ hrs

FYCS Semester II

Max Marks: 75

Advanced Python Programming

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) 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.

Max Time: 2½ hrs | **FYCS Semester II** | Max Marks: 75

Introduction to OOPS Using C++

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 bitwise operators in C++ with examples.
B) Explain the 'for' loop in C++ with an examples.
C) Explain various data types and qualifiers in C++.
D) Write a program in C++ to print prime numbers between 2 to 100.
E) Write a program to check if a given a number taken from the user is a palindromic number or not.
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 method overloading in C++ with examples.
B) Explain the 'this' keyword with examples.
C) Write a note on friend function.
D) Create a class to represent a complex number. Define appropriate constructor. Overload the operators for multiplying 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) A microwave control panel has four buttons: one for increasing the time by 30 seconds, one for switching between power levels 1 and 2, a reset button, and a start button. Write a program in C++ to implement a class that simulates the microwave, with a member function for each button. The member function for the start button should print a message "Cooking for ... seconds at level ..."

Q3) Attempt any four: (20)

A) Write a program in C++ to implement a base class Person. Derive classes Student and Instructor from Person. A person has a name and an age. A student has a major subject, and an instructor has a salary. Write the class definitions, the constructors, and the member functions 'display' for all classes.

B) Explain the need of 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) Write a note on method overriding in C++.

Q4) Attempt any five: (15)

A) Explain the pre and post increment operators in C++ with examples.

B) Write a note on destructor in C++ with examples.

C) Explain the need of pure 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) Write a program in C++ to read the content of a file and display it on the monitor.

FY BSc Computer Science Sem II

Max Time: 2½ hrs | Database System | Max Marks: 75

Instructions:

1) All questions are **compulsory**.
2) Mixing of sub questions are not allowed.
3) Write in clear and legible writing.

Q.1 Attempt any **FOUR** (20)

A) Explain the functions of DBA.
B) Describe the overall architecture of DBMS with diagram.
C) Describe various constraints of Specialization and Generalization.
D) What is relationship in ER model? What are the types of mapping constraints?
E) Explain Order by clause with suitable example.
F) Write a note on total participation and partial participation.

Q.2 Attempt any **FOUR** (20)

A) Explain various operators available in Relational algebra.
B) Explain JOIN in detail.
C) Explain various String functions available in MySQL.
D) Explain various Math functions in MySQL.
E) Explain concept of sub query in detail
F) Describe various operator for multiple sub query.

Q.3 Attempt any **FOUR** (20)

A) What are the types of functional Dependencies explain in brief.
B) What are the properties of Decomposition explain in detail.
C) Explain different anomalies with suitable example.
D) Define the term privilege with respect to database and its types.
E) Explain BACKUP and RESTORE in database.
F) Explain the primary and secondary index with suitable example.

Q.4 Attempt any **FIVE** (15)

A) What are the different types of database system users?
B) Explain the following term with suitable example.
   i) Single valued attribute
   ii) Multivalued attribute
   iii) Composite attribute
C) Explain CREATE and DROP command with suitable example.
D) Explain domain relation constraints in detail.
E) Explain concept of equi JOIN operation in Relational algebra.
F) Write a note on BCNF.

Max Time: 2½ hrs | FYCS Semester II | Max Marks: 75

CALCULUS

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) Draw the graph of $y = 4 - 3x^2 + x^3$.

B) Find the local maximum and local minimum values for the function $f(x) = 1 - 12x + x^3$

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) Using Newton's method find x_1, x_2, x_3, x_4 & x_5 $f(x) = x^3 - 3x^2 - 55x + 9.5$, *take* $x_0 = 0$

E) Determine the absolute extrema for the functions $f(x) = x^3 - 2x^2 + 3$ in [-2,3]

F) Write the definition of left hand and right hand derivative. And solve the following example

if $f(x) = 4x + 1, \quad x \leq 2$

$= x^2 + 5, \quad x > 2$; at x=2 , then find f is differentiable or not?

Q2) Attempt any four: (20)

A) Solve the following integration by parts $\int \omega^2 \sin(10\omega)\, d\omega$

B) solve the following integration using substitution method $\int x^5 e^{1-x^6}$

C) Use Simpson's rule with n=4 to estimate $\int_0^4 x^2\, dx$

D) Find the length of area of the curve in one period of the cycloid $x = t - \sin t$, $y = 1 - \cos t$. The values of t run from 0 to 2π.

E) Solve the the definite integrals using substitution method $\int_1^5 (1+t)(2t+t^2)dt$

F) Find the area of the curve $y = \frac{1}{6}x^3 + \frac{1}{2}x^{-1}$ from x=1 to x=2

Q3) Attempt any four: (20)

A) Find all Second Order Partial Derivative of f. Also verify whether $f_{xy} = f_{yx}$ at any(x, y)

$$(x, y) = x^4 + 7x^2y^3 - 5x^3y^2 + y^4$$

B) Find linearization of each at f at the each point

$$f(x, y) = x^3 + xy + y^2 \; at \; (1,2)$$

C) Use chain rule to find $\frac{dz}{dt}$, where z = f(x, y)for the following function

$$f(x, y) = x^3 + y^3, x = t^2 - 1, y = 4t + 1$$

D) find $\frac{dy}{dx}$ for each function at given point, based on Implicit Differentiation

$$f(x, y) = y^2 + x^3 - xy = 0, at \; t = (2,3)$$

E) find the gradient vector of f(x, y) where

(a) $f(x,y) = x^3 + 2xy^2$. *Evaluate it at* $(-3,-1)$

(b) $f(x,y) = e^x + \cos 2y$, *find* $\nabla f(0,\pi/2)$:

F) Find the local maxima and minima for the following functions

$$f(x,y) = x^3 + 2y^3 - 3x^2 - 24y + 16$$

Q4) Attempt any five: (15)

A) Divide the number 100 into two parts such that their square is maximum.

B) Divide the number 15 into two parts such that the square at one part is multiplied with the cube of other part is maximum.

C) given that $\int_2^3 f(x)dx = 6$ and $\int_2^3 g(x)dx = 10$ then calculate $\int_2^3 (f(x) + g(x))dx$.

D) Evaluate $\int_1^3 (x^2 - 4x + 1)dx$.

E) Evaluate the following limits based on functions of Two or More Variables

(a) $\lim_{(x,y)\to(1,1)} \left(\frac{x^2+xy-y+4}{x+y}\right)$ (b) $\lim_{(x,y)\to(3,1)} \left(\frac{x^2-2xy-3y^2}{x-3y}\right)$

F) *If* $f(x,y) = x^3y^2 + x^2y^3 + 3xy$, *find* f_x, f_y *t any* (x,y).

****

Max Time: 2½ hrs | **FYCS Semester II** | Max Marks: 75

Statistical Method

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) The following is cumulative distribution function of a discrete random variable X

X	1	2	3	4	5	6	7	8
F(X)	0.2	0.4	0.45	0.6	0.68	0.82	0.9	1.00

Find: i) p.m.f of X ii) $P(2 \leq X \leq 5)$ iii)P(2<X<7) iv)P(X>4) v)$P(X \geq 3)$

B) Let X be continuous random variable with p.d.f.

$f(x) = kxe^{-x} \quad x \geq 0$

$= 0$ otherwise

Find i) k ii) mean iii) Standard deviation.

C) Write the properties of Chi square distribution.

D) The germination success rate for begonia seeds is 60%. In a package of 200 seeds, what is the probability that over half of them germinate, what is P(X > 100)? **(P(Z<2.89)=0.4981)**

E) Write the properties of F distribution.

F) The lion population in Gir National park is approximately normally distributed with mean $\mu = 4400$ lion and standard deviation 620 lion. Convert each of the following x intervals to z intervals and find the associated probability.

a) more than 3300 b) less than 5400 c) between 3500 and 5300

[P(0<z<1.77)=0.4616 , P(0<z<1.61)=0.4463, P(0<z<1.45)=0.4265]

Q2) Attempt any four: (20)

A) A company that manufactures chocolate bars is particularly concerned that the mean weight 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. $(Z_\alpha = 2.33)$

B) A process is known to produce bricks whose weights are normally distributed with standard deviation 0.12 pounds. A random sample of sixty bricks from today's output had a mean weight of 4.07 pounds. Find a 99% confidence interval for the mean weight of all bricks produced today. $(Z_\alpha = 2.58)$

C) The manufacturing of rubber chemicals by a batch process, has a normal yield of 690 lbs per batch. A new process is tried experimentally on 12 batches with the following yields: 620, 590, 660, 620,700, 710, 690, 720, 700, 690, 720 and 650 lbs. Is the yield of the new process a significantly different from that of the old process? (Level of significance is 0.01) $(t_{(\alpha/2,\ n-1)} = 3.106)$

D) You are the manager of a restaurant that delivers pizza to college dormitory rooms. You have just changed your delivery process in an effort to reduce the mean time between the order and completion of delivery from the current 25 minutes. From past experience, you can assume that the population standard deviation is 6 minutes. A sample of 36 orders using the new delivery process yields a sample mean of 22.4 minutes. At the 0.05 level of significance, is there evidence that the population mean delivery time has been reduced below the previous population mean value of 25 minutes? $(Z_\alpha = 1.64)$

E) A real estate agency wants to compare the price of two BHK flats in two areas of Bangalore City. A sample of 60 listings in Area 1 and 99 listings in Area 2 yields the following results (in lakhs of rupees)

	Area 1	Area 2
Mean	72	61
Population SD	13	18
n	60	99

At the 0.050.05 level of significance, Is there is evidence that the average price in area 1 is higher than area 2? $(Z_{\alpha} = 1.64)$

F) The height of six randomly chosen soldiers are in inches: 63,65,68,69,71, and 72. Those of Set 10 randomly chosen sailors are 61,62,65,66,69,69,70,71,72,73. Is there evidence that soldiers are taller than sailors at 10% level of significance? ($t_{(\alpha,\ n_1+n_2-2)} = 1.76$)

Q3) Attempt any four: (20)

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) 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. 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

C) 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

D) A new skill based education is proposed to enhance student's ability of employment at graduate level. Professors are concerned with student's ability to employability and assess their marks before and after receiving the new treatment.

1=poor,2=fair,3=good,4=Very good, 5= excellent. The data are shown below.

(use Sign test, r at 0.05 L.O.S is 2)

Student	1	2	3	4	5	6	7	8	9	10	11	12
Marks before treatment	3	2	3	2	1	3	2	3	2	1	3	2
Marks After Treatment	2	3	4	4	1	4	4	3	1	3	4	3

E) Explain Mann Whitney U test.

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

Q4) Attempt any five: (15)

A) 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. find mean and variance.

B) Determine K such that the following are p.m.f. $P(x)=\frac{k2^x}{x!}$ For X=0,1,2,3

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 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: $n_1 = 10$, $S_1^2 = 210.2$, Accounting: $n_2 = 10$, $S_2^2 = 36.5$
At the 5% level of significance is there is evidence to support professor's claim? $(F_{(\alpha, n_1-1,\ n_2-1)} = 3.07)$

E) What is sign test?

F) Differentiate between parametric and non-parametric test.

****

Max Time: 2½ hrs **FYCS Semester II** Max Marks: 75

<E commerce and digital marketing>

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. Give difference between traditional marketing and didgital marketing.
B. List and explain different E- commerce business models.
C. Explain different types of electronic payment schemes.
D. What is E- commerce? explain opportunities and challenges in E- commerce.
E. Write a short note on the digital landscape.
F. Explain skills required in digital marketing.

Q2) Attempt any four: (20)

A. What is social media marketing? explain types of social media websites.
B. What is content marketing? explain challenges for content marketing .
C. Explain tiwitter advertising campaign.
D. Explain facebook marketing tools.
E. Explain types of Emails and email marketing tools.
F. Write a short note on youtube marketing and monietization.

Q3) Attempt any four: (20)

A. What is SEO? Explain common SEO techniques.
B. Write a note on google ad word.
C. Explain in detail google ranking and link building.
D. What is web analytics? list and explain different web analytics tools.
E. List and explain mistakes and pitfalls of web analytics.
F. Explain steps for installing google analytics on the website.

Q4) Attempt any five: (15)

A. Explain importance of LinkedIn marketing.
B. Explain segmenting and customizing messages.
C. Write a note on target audience.
D. Explain different types of content.
E. Explain goals and objectives of web analytics.
F. What is blog? Explain different types of blogs.