P.D.J. College, Chiplun

Semester - IV MTKT Examination March-25

Class: F.Y.I.T. Subject: Object oriented Programming with C++

Date: - 10/3/2025 Time: - 2.00 to 4.30pm.

Duration: 2.30 Hrs. **Full Marks: 75**

Instructions: (1) All questions are compulsory.
(2) Numbers to the right indicate marks.
(3)Assume necessary data required.

Q.1 **Attempt the following (any three)**

A) Explain the following characteristics of OOP : (15)
i)Encapsulation ii)Polymorphism, iii)Inheritance

B) Differentiate between Procedural programming and Object oriented programming.

C) Write a C++ program that displays first 10 even numbers.

D) Explain Switch statement with an example.

E) Write a program in C++ to check whether the given no is prime or not.

F) Differentiate between user defined data types and derived data types.

Q.2 **Attempt the following (any three)** (15)

A) What is Constructor? Explain its types with an example.

B) What is meant by function prototyping? Explain the importance of call by value.

C) Write a C++ program to swap two numbers using pointer.

D) Explain different uses of scope resolution operator in C++.

E) Write a C++ program to implement friend class.

F) Explain function overloading with an example.

Q.3 **Attempt the following (any three)** (15)

A) What are different forms of inheritance? Explain anyone with an example.

B) Explain the term Abstract class with an example.

C) What is virtual function ? How does it implement in polymorphism ?

D) Write a program to find the area of rectangle using single heritance.

E) Discuss the use of public, private and protected access specifiers and their visibility in the class.

F) Explain use of pointer in C++.

Q.4 **Attempt the following (any three)** (15)

A) What is stream? Enlist the various stream classes.

B) Write a program in a C++ to write and read a string from / to a file.

C) Explain the concept of a template with the help of an example.

D) Define exception handling. Explain the use of try, catch and throw for exception handling in C++.

E) Write a C++ program that throws an arithmetic exception whenever the input numbers is less than zero.

F) What is the use of this keyword in C++?

Q.5 **Attempt the following (any three)** (15)

A) List and explain the use of Standard Template Library.

B) How string is used in C++? How can we create string object?

C) Explain the use of ifstream and ofstream classes for file input and output.

D) Write a C++ program using function template to find the sum of two integers or floating point type of data.

E) Write a program in C++ for comparing two string by using string object.

F) Write a program using put() to write characters to a file until user enters a dollar sign.

D.B.J. College, Chiplun

Semester II RTKT Examination March-25

Class:- F.Y.I.T. Subject:- Numerical Methods

Time : 2.30 Hrs. Date:- 11/3/2025, Time:- 2 to 4.30. **Full Marks: 75**

Instructions:

(1) All questions are compulsory.

(2) Numbers to the right indicate full marks.

(3) Use of scientific calculator is allowed.

Q.1) Attempt any three of the following: 15

1. The derivative of a function $f(x)$ at a particular value of x can be approximately calculated by

$$f'(x) \approx \frac{f(x + h) - f(x)}{h}$$

of $f'(2)$ For $f(x) = 7e^{0.5x}$ and $h = 0.3$, find

a) relative true error

b) absolute relative true error

2. Find the value of $f(6)$ given that $f(4) = 125, f'(4) = 74, f''(4) = 30, f'''(4) = 6$ and all other higher derivatives of f(x) at $x = 4$ are zero.

3. If 1.414 is used as an approximate to $\sqrt{2}$. Find the absolute, relative and percentage error.

4. If true value of $x = 1.732$ and approximate value of $x = 1.73$ and $z = x^3+x^2-1$, then find the absolute , relative and percentage error in calculation of z.

5. Illustrate with an example the concept of overflow and underflow.

6. Round off 0.987250 correct four significant figures and find out absolute , relative and percentage error.

Q.2) Attempt any three of the following: 15

1. Using Newton-Raphson method, find the appropriate root of the equation $x^3 - 3x - 5 = 0$ up to two approximations by taking initial root 2.

2. Obtain the root of $f(x) = x^3 - 2x - 5$ using Regula-falsi method

3. Find the root $x^4 - x - 10 = 0$ up to two iterations by taking initial roots 1 and 2 using secant method.

4. Using Lagrange's interpolation formula, calculate the profit in the year 2000 from the following data.

Year	1997	1999	2001	2002
Profit	43	65	159	248

5. Find y at x= 1.5 by using Newton's forward interpolation formula for the following data

X	1	2	3	4	5
Y	2	4	8	16	32

6. By using Newton's backward interpolation formula, estimate the sales for the year 1995 from the following data

x(years)	1961	1971	1981	1991	2001
Sales	46	66	81	93	101

Q.3) Attempt any three of the following:

1. Solve the following linear equations using Gauss Jordan method
$x + y + z = 90, 2x + 3y + 6z = 370, 3x - 8y - 4z = -340$

2. Solve the following linear equations using Gauss Seidel method
$10x + y + z = 12, 2x + 10y + z = 13, 2x + 2y + 10z = 14$

3. Evaluate $\int_0^6 \frac{1}{1+x}\, dx$ by Simpson's 1/3 rd rule

4. Evaluate $\int_0^1 \frac{1}{1+x}\, dx$, h= 0.125 by Trapezoidal rule

5. Evaluate $\int_1^4 (4x - 1)\, dx$ by Simpson's 3/8 th rule

6. Explain the Trapezoidal rule.

Q.4) Attempt any three of the following:

1. Find the coefficients of regression and the coefficient of correlation

X	2	4	6
Y	6	2	1

Find y, when x=1 and x when y=2

2. Using runge kutta method of second order to find y(0.2),
Given $\frac{dy}{dx} = y + x,\ y(0) = 2, h = 0.1.$

3. Use Taylor series method to obtain the solution of $\frac{dy}{dx} = 3x + y^2$. Given y(0)=1. Find y(0.1).

4. Consider two regression lines
y on x :$4x - 3y = 10$
x on y: $5x + y = 7$
find, $\bar{x}, \bar{y}, b_{xy}, b_{yx}$

5. For a given data

	X	Y
Mean	3	5
Variance	2.5	0.5

And the covariance is 0.25, find
(I)the equations of the lines of regression
(II)find y, when x=4 and x when y = 3

6. For the data given below

X	2	3	4
Y	3	5	7

Find

(I)the coefficient of correlation (r)

(II) the coefficients of regressions : b_{xy} , b_{yx}

(III) the equations of both the lines of regression.

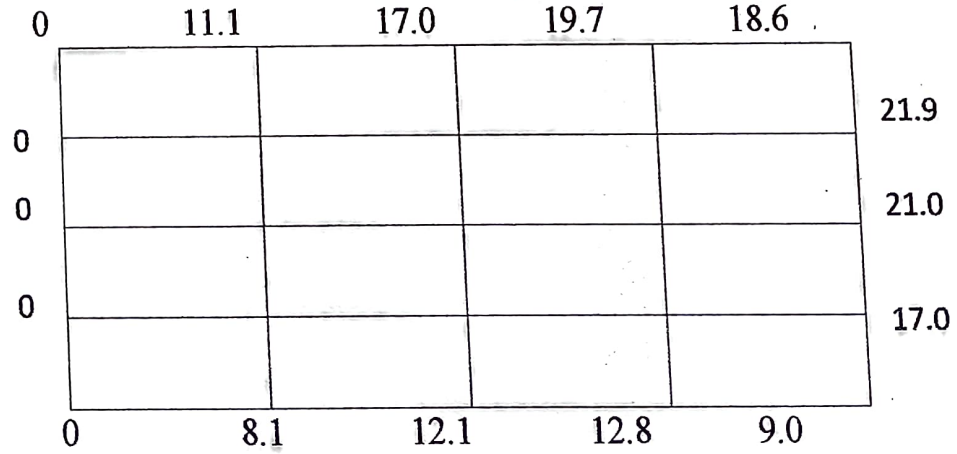
Q.5) Attempt <u>any three</u> of the following: **15**

1. Find the value of the function u(x,t) satisfying the equation $\frac{\partial u}{\partial t} = 4\frac{\partial^2 u}{\partial x^2}$ and the boundary functions $u(0,t) = 0, u(8,t) = 0, u(x,0) = \frac{1}{2}x(8-x)$ at the points x= i, $i = 0,1,2,3,4$ *and* $t = \frac{1}{8}j, j = 0,1,2,3,4,5.$

2. Given that $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, u(0,t) = 0, u(5,t) = 0$ *and* $u(x,0) = 10x\,(5-x)$. Compute u for one time step by taking $h = 1$and $k = 1$using Crank Nikolson's method.

3. Classify $(1+x^2)\frac{\partial^2 u}{\partial x^2} + (5+2x^2)\frac{\partial^2 u}{\partial x \partial t} + (4x+x^2)\frac{\partial^2 u}{\partial t^2} = 0$

4. Find by Liebmann's method, the value at the interior lattices points of a square region of the harmonic function whose bounding values are shown in the figure



5. Solve graphically the following LPP

Maximize z=50x+60y

Subject to :

$2x+3y \leq 150$

$3x+2y \leq 150$

$x \leq 45$

6. Explain graphical method for solving LP problem