

GANPAT UNIVERSITY
B.TECH III SEM MECHATRONICS ENGINEERING
REGULAR EXAMINATION NOV/DEC-2012
2MC301/MC301 NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING
TIME – 3 HOURS **TOTAL MARKS- 70**

- INSTRUCTION:-
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Make suitable assumptions wherever necessary.

Section –I

- Q-1 (a) What is scope resolution operator? Explain with program. [12]
 (b) What do you mean by Inheritance? Describe multiple and multilevel inheritance.
 (c) Explain abstraction with using an example.

OR

- Q-1 (a) Which are the rules for operator overloading? [12]
 (b) What is operator overloading explain with example.
 (C) Explain encapsulation with using an example.

- Q-2 (a) Explain nested member function with suitable example. [4]
 (b) What is output of following Program? Give input as you like. [3]

```
#include<iostream.h>
#include<conio.h>
#include<stdio.h>
void main()
{
int a[10],i,j,temp=0;
clrscr();
for(i=0;i<10;i++)
{
cout<<"Enter a["<<i<<" ] = ";
cin>>a[i];
if(a[i]>temp)
{
temp=a[i];
}
}
cout<<"The greater number is : " <<temp;
getch();
}
```

- (C) Write a program to display following output using for loop. [4]
 UVPCE
 UVPC
 UVP
 UV
 U

OR

- Q-2 (a) What is the virtual function? [3]
(b) Write a program to calculate the sum of following series [4]
 $s=1+3+5+7+9+\dots+n$
(c) Write a Program to display given number in letter. [4]
- Q-3 Write any three. [12]
- (a) Write a Program which enters the user number and calculates the Power consumed using following units data.
to 200 unit =10 Rs., 201 to 400 unit =20 Rs., 401 to 600 unit =30 Rs., then unit 600 = 50 Rs.
(b) Write a Program to convert Decimal number to Binary.
(c) Write a Program to implement Hierarchical inheritance concept.
(d) What are tokens? Write application and benefits of OOP.

Section -II

- Q-4 (a) Using Taylor's series method, Obtain the solution of $\frac{dy}{dx} - x^2 = y^2$. Where $y(0) = 1$. [12]
Also find the value of y at $x = 0.1$.
(b) Using Runge-Kutta second order method, find an approximate value of y at $x = 1$.
Taking $h = 0.1$. Where $\frac{dy}{dx} = x^2 + y^2$, $y(1) = 0$.

OR

- Q-4 (a) Using Euler's method, find an approximate value of y corresponds $x = 1$, given that [12]
 $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$. Take step size $h = 0.1$.
(b) Given that :

| | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|--------|
| X | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
| Y | 7.989 | 8.403 | 8.701 | 9.129 | 9.451 | 9.750 | 10.031 |

Then find $(\frac{dy}{dx})$ and (d^2y/dx^2) at $x = 1.1$ and $x = 1.6$. Using Newton's forward and backward formulation.

- Q-5 (a) By means of Newton's Divided difference formula, find the value of $f(8)$ and $f(15)$ from [5]
the following table :

| | | | | | | |
|-------|----|-----|-----|-----|------|------|
| X: | 4 | 5 | 7 | 10 | 11 | 13 |
| F(x): | 48 | 100 | 294 | 900 | 1210 | 2028 |

- (b) Find a real root of the equation : [6]
 $\cos x = 3x - 1$
 Correct to 3 decimal places using iteration method.

OR

- Q-5 (a) Solve : [6]
 $2x_1 + 4x_2 - 6x_3 = -4$
 $x_1 + 3x_2 + x_3 = 10$
 $2x_1 - 4x_2 - 2x_3 = -12$
 Using Gauss - Jordan Method.
- (b) Consider the problem, find the square root of 2.5. Using the second order interpolation polynomial [5]

| | | | | | |
|------|---|--------|--------|---|--------|
| X | 1 | 2 | 3 | 4 | 5 |
| F(x) | 1 | 1.4142 | 1.7321 | 2 | 2.2361 |

- Q-6 (a) Using bisection method, determine a real root of the equation. [12]
 $F(x) = 8x^3 - 2x - 1 = 0.$

- (b) Given the following set of data point, obtain the table of divided difference. Use the table of estimate the value of $f(1.5)$.

| | | | | | |
|----------|---|---|----|----|-----|
| i | 0 | 1 | 2 | 3 | 4 |
| x_i | 1 | 2 | 3 | 4 | 5 |
| $f(x_i)$ | 0 | 7 | 26 | 63 | 124 |

*****END OF PAPER*****