

1) The minimum number of terms required in the series expansion of e^x to evaluate at $x = 1$ correct up to 3 places of decimals is

- a) 8 b) 7 c) 6 d) 5

2) The iteration scheme $x_{n+1} = \frac{1}{1+x_n^2}$ converges to a real number x in the interval $(0, 1)$ with $x_0 = 0.5$. The value of x correct up to 2 places of decimal is equal to

- a) 0.65 b) 0.68 c) 0.73 d) 0.80

3) If the diagonal elements of a lower triangular square matrix A are all different from zero, then the matrix A will always be

- a) symmetric b) non-symmetric c) singular d) non-singular

4) If the two eigen values of the matrix $M = \begin{pmatrix} 2 & 6 & 0 \\ 1 & p & 0 \\ 0 & 0 & 3 \end{pmatrix}$ are -1 and 4 , then the value of p is

- a) 4 b) 2 c) 1 d) -1

5) Consider the system of linear simultaneous equations

$$x + 10y = 5, \quad (1)$$

$$y + 5z = 1, \quad (2)$$

$$10x - y + z = 0 \quad (3)$$

On applying Gauss-Seidel method the value of x correct up to 4 decimal places is

- a) 0.0385 b) 0.0395 c) 0.0405 d) 0.0410

6) The graph of a function $y = f(x)$ passes through the points $(0, -3)$, $(1, -1)$, and $(2, 3)$. Using Lagrange interpolation, the value of x at which the curve crosses the x -axis is obtained as

- a) 1.375 b) 1.475 c) 1.575 d) 1.675

7) The equation of the straight line of best fit using the following data by the principle of least square is

x	1	2	3	4	5
y	14	13	9	5	2

- a) $y = 18 - 3x$ b) $y = 18.1 - 3.1x$ c) $18.2 - 3.2x$ d) $18.3 - 3.3x$
- 8) On solving the initial value problem $\frac{dy}{dx} = xy^2, y(1) = 1$ by Euler's method, the value of y at $x = 1.2$ with $h = 0.1$ is
- a) 1.1000 b) 1.1232 c) 1.2210 d) 1.2331
- 9) The local error of the following schme $y_{n+1} = y_n + \frac{h}{12} (5y'_{n+1} + 8y'_n - y'_{n-1})$ by comparing with the Taylor series $y_{n+1} = y_n + hy'_n + \frac{h^2}{2!}y''_n + \dots$ is
- a) $O(h^4)$ b) $O(h^5)$ c) $O(h^2)$ d) $O(h^3)$
- 10) The area bounded by the curve $y = 1 - x^2$ and the x -axis from $x = -1$ to $x = 1$ using the Trapezoidal rule with step length $h = 0.5$ is
- a) 1.20 b) 1.23 c) 1.25 d) 1.33
- 11) The iteration scheme $x_{n+1} = \sqrt{a} \left(1 + \frac{3a^2}{x_n^2} \right) - \frac{3a^2}{x_n}$, $a > 0$ converges to the real number
- a) \sqrt{a} b) a c) $a\sqrt{a}$ d) a^2
- 12) If the binary representation of two numbers m and n are 01001101 and 00101011, respectively, then the binary representation of $m - n$ is
- a) 00010010 b) 00100010 c) 00111101 d) 00100001
- 13) Which of the follwing statements are true in a C program?
P: A local variable is used only within the block where it is defined, and its sub-blocks
Q: Global variables are declared outside the scope of all blocks
R: Extern variables are used by linkers for sharing between other compilation units
S: By default, all global variables are extern variables
- a) P and Q b) P,Q and R c) P,Q and S d) P,Q,R and S
- 14) Consider the following recursive function $g()$
Recursive integer function $g(m, n)$ result (r)
integer :: m, n
if ($n == 0$) *then*
 $r = m$
else if ($m \leq 0$) *then*
 $r = n + 1$

```

else if ((n - n/2 * 2) == 1) then
  r = g(m - 1, n + 1)
else
  r = g(m - 2, n/2)
end if
end

```

Which value will be returned if the function g is called with 6, 6?

- a) 2
- b) 4
- c) 6
- d) 8

15) If the following function is called with $x = 1$

```

real function print_value(x)
  real :: x, sum, term
  integer :: i
  i = 0
  sum = 2.0
  term = 1.0
  do while (term > 0.00001)
    term = x * term / (i + 1)
    sum = sum + term
    i = i + 1
  end do
  print_value = sum
end

```

The value returned will be close to

- a) $\log_e 2$
- b) $\log_e 3$
- c) $1 + e$
- d) e

16) Consider the following C program

```

include <stdio.h>
include <string.h>
void main()

```

```

  char s[80], *p;
  int sum = 0;
  p = s;
  gets(s);
  while (*p)

```

```

    if (*p == 'I')
      sum = 2 * sum + 1;
    else if (*p == 'O')
      sum = sum * 2;
    else

```

```
printf("invalid string");
p++;
```

```
printf("%d", sum);
```

Which number will be printed if the input string is 10110

a) 31

b) 28

c) 25

d) 22

17) Consider the following C program segment

```
#include <stdio.h>
void print_mat(int mat[1][3])

void main(){
    int i,j,sum=0;
    int m[3][3]={1, 3, 5}, {7, 9, 11}, {13, 15, 17}};
    for(i = 0; i<3; i++){
        for(j = 2; j>1; j--){
            sum+=m[i][j] * m[i][j-1];
            printf("%d", sum)
            print_mat(m);//FUNCTION CALL
        }

    void print_mat(int mat[][3]){
        int *p[3]=mat[1];
        printf("%d and %d",*p[1],*p[2]);
    }
}
```

The value of sum that will be printed by the above program is

a) 369

b) 361

c) 303

d) 261