gate 1

EE24Btech11041 - Mohit

Q.7-Q.24 carry two marks each

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 (XE 2007)

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 (XE 2007)

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 (XE 2007)

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

4) If two eigenvalues 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: (XE 2007)

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

5) Consider the system of linear simultaneous equations:

$$x + 10y = 5; \quad y + 5z = 1; \quad 10x - y + z = 0$$

On applying Gauss-Seidel method, the value of x correct up to 4 decimal places is: (XE 2007)

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 $(0, -3), (1, -1), (2, 3)$. Using Lagrange interpolation, the value of x at which the curve crosses the x-axis is obtained as: (XE 2007)

a) 1.375 b) 0.0395 c) 0.0405 d) 0.0410

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

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

is: (XE 2007)

a) $y = 18 - 3x$ b) $y = 18.1 - 3.1x$ c) $y = 18.2 - 3.2x$ d) $y = 18.3 - 3.3x$

8) On solving the initial value problem:

$$\frac{dy}{dx} = xy^2, \quad y(1) = 1 \tag{1}$$

by Euler's method, the value of y at $x = 1.2$ with $h = 0.1$ is:

(XE 2007)

a) 1.1000 b) 1.1232 c) 1.2210 d) 1.2331

9) The local error of the following scheme:

$$y_{n+1} = y_n + \frac{h}{12}(5y'_{n+1} + 8y'_n - y'_{n-1}) \tag{2}$$

by comparing with the Taylor series:

$$y_{n+1} = y_n + hy'_n + \frac{h^2}{2!}y''_n + \cdots \tag{3}$$

is: (XE 2007)

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 Trapezoidal rule with step length $h = 0.5$ is: (XE 2007)

a) 1.20 b) 1.23 c) 1.25 d) 1.33

11) The iteration scheme:

$$x_{n+1} = \sqrt{a}\left(1 + \frac{3a^2}{x_n^2}\right) - \frac{3a^2}{x_n}, a > 0 \tag{4}$$

converges to the real number: (XE 2007)

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: (XE 2007)

a) 00010010 b) 00100010 c) 00111101 d) 00100001

13) Which of the following 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 (XE 2007)

a) P and Q b) P, Q and R c) P, Q and S d) P, Q, R and S

4

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 <= 0) then
    r = n + 1
else if ( (n - n/2*2) == 1) then
    r = g(m-2 , n/2)
end if
end
```

Which value will be returned if the function g is called with 6, 6 ? (XE 2007)

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 (XE 2007)

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 == '1')
            sum = 2*sum + 1;
        else if (*p == '0')
            sum = sum * 2;
        else
            printf("invalid string");
        p++;
    }
    printf("%d", sum);
}
```

Which number will be printed if the input string is 10110? (XE 2007)

a) 31 b) 28 c) 25 d) 22

17) The value of sum that will be printed by the program is (XE 2007)
Consider the following C program segment

```c
#include <stdio.h>

void print_mat(int[][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]);
}
```

a) 369 b) 361 c) 303 d) 261