

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:

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

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:

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

by comparing with the Taylor series:

$$y_{n+1} = y_n + hy'_n + \frac{h^2}{2!} y''_n + \dots \quad (3)$$

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:

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

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

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14) Consider the following recursive function $g()$.

```

1 Recursive integer function g(m,n) result (r)
2 integer :: m,n
3 if (n == 0) then
4     r=m
5 else if (m <= 0) then
6     r = n + 1
7 else if ( (n - n/2*2) == 1) then
8     r = g(m-2 , n/2)
9 end if
10 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 $x = 1$

```

1 real function print_value(x)
2 real :: x , sum , term
3 integer :: i
4 i = 0
5 sum = 2.0
6 term = 1.0
7 do while (term > 0.00001)
8     term = x * term/(i+1)
9     sum = sum + term
10    i = i + 1
11 end do
12 print_value = sum
13 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

```

1 #include <stdio.h>
2 #include <string.h>
3
4 void main()
5 {
6     char s[80], *p;
7     int sum = 0;
8     p = s;
9     gets(s);
10    while (*p)
11    {
12        if (*p == '1')
13            sum = 2*sum + 1;
14        else if (*p == '0')
15            sum = sum * 2;
16        else
17            printf("invalid string");
18        p++;
19    }
20    printf("%d", sum);
21 }

```

Which number will be printed if the input string is 10110?

(XE 2007)

a) 31

b) 28

c) 25

d) 22

I. COMMON DATA QUESTIONS

Common Data for Questions 23,24:

Consider the following C program segment

```

1 #include <stdio.h>
2
3 void print_mat(int[][3]);
4
5 void main() {
6     int i, j, sum = 0;
7     int m[3][3] = {{1, 3, 5}, {7, 9, 11}, {13, 15, 17}};
8
9     for (i = 0; i < 3; i++) {
10         for (j = 2; j > 1; j--) {
11             sum += m[i][j] * m[i][j - 1];
12         }
13     }
14
15     printf("%d", sum);
16     print_mat(m); // FUNCTION CALL
17 }
18
19 void print_mat(int mat[][3]) {
20     int (*p)[3] = &mat[1];
21     printf("%d and %d", (*p)[1], (*p)[2]);
22 }

```

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

a) 369

b) 361

c) 303

d) 261