

XE 2007

EE24BTECH11063 - Y.Harsha Vardhan Reddy

B : COMPUTATIONAL SCIENCE

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

a) 8
b) 7
c) 6
d) 5
- 2) The iteration scheme $x_{n+1} = 1/(1 + x_n)^2$ 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 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

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

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

by the principle of least square is

- a) $y = 18 - 3x$ b) $18.1 - 3.1x$
 c) $y = 18.2 - 3.2x$ 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 scheme

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

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 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

$$x_{n+1} = \sqrt{a} \left(1 + \frac{3a^2}{x_n^2} \right) - \frac{3a^2}{x_n}, \quad a > 0 \text{ converges to the real number}$$

- 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 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

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

14) The iteration scheme

$$x_{n+1} = \sqrt{a} \left(1 + \frac{3a^2}{x_n^2} \right) - \frac{3a^2}{x_n}, \quad a > 0 \text{ converges to the real number}$$

- a) \sqrt{a} b) a c) $a\sqrt{a}$ d) a^2

15) 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-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

16) 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 > 0.0001)
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

17) 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?

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