XE 2008 18-34

EE24BTECH11005 - Arjun Pavanje

18) For the initial value problem, $\frac{dy}{dx} + y = 0, y(0) = 1, y_1$ is the computed value of y at $x = 0.2$ obtained by using Euler's method with step size $h = 0.1$. Then

a) $y_1 < e^{-0.2}$

b) $e^{-0.2} < y_1 < 1$

c) $1 < y_1$

d) $y_1 = e^{-0.2}$

19) Consider the initial value problem $\frac{dy}{dx} = y + x$ with $y(0) = 2$. The value of $y(0.1)$ obtained using the fourth Runge-Kutta method with step size $h = 0.1$ is

a) 2.2

b) 2.215

c) 2.21551

d) 2.21576

20) The following table gives a function $f(x)$ vs x The best fit of a straight line for the

x	0	1	2	3	4
$f(x)$	1.0	3.7	6.5	9.3	12.1

above data point, using a least square method error is

a) $2.75x + 0.55$

b) $2.80x + 0.80$

c) $3.10x + 0.85$

d) $2.78x + 0.96$

21) Consider the following part of a Fortran 90 function

```
INTEGER FUNCTION RESULT (X)
    INTEGER:: X
    VALUE =1
    DO
        IF (X == 0) EXIT
        TERM = MOD (X,10)
        VALUE = VALUE*TERM
        X = X/10
    END DO
    RESULT = VALUE
END FUNCTION RESULT
```

If the above function is called with an integer $X = 123$, the value returned by the function will be

a) 0 b) 6

c) 9 d) 321

22) Consider the following part of a Fortran 90 function

```
PROGRAM CHECK−CYCLE
    DO I=1,10,2
        IF (MOD(I,3)==0)CYCLE
        PRINT *,I
    END DO
    TERM = MOD(X,10)
END PROGRAM CHECK−CYCLE
```

The value returned by the program will be

a) $\begin{pmatrix} 1 \\ 5 \\ 7 \end{pmatrix}$ b) $\begin{pmatrix} 1 \\ 3 \\ 5 \end{pmatrix}$

c) $\begin{pmatrix} 1 \\ 3 \\ 7 \end{pmatrix}$ d) $\begin{pmatrix} 3 \\ 5 \\ 7 \end{pmatrix}$

23) P, Q, R, S are segments of a Fortran 90 code

```
(P) IF (A > B) P=Q

(Q) SUBROUTINE SWAP(A,B)
    INTEGER, INTENT(IN)::A,B
    TEMP A
    A=B
    B=TEMP
    END SUBROUTINE SWAP
(R) IF (A/=B) X =Y−Z
    ELSE
        X=Y+Z
    ENDIF
(S) DO I=1,N,3
        C(I)=A(I)+B(I)
    END DO
```

Which segments have syntax error

a) P, Q b) Q, R

c) R, S d) P, S

24) A fortran-90 subroutine for Gauss-Siedel Method to solve a set of N simultaneous equations $[A]\ [X] = [C]$ is given below,

```
SUBROUTINE SIEDEL(A,C,X,N,IMAX)
REAL :: SUM
REAL, DIMENSION(N,N) :: A
REAL, DIMENSION(N)::C,X
    DO K=1,IMAX
        DO I=1,N
            SUM=0.0
            DO J =1, N
                IF (I/=J) THEN
                    SUM = SUM + A (I,J)*X(J)
                ENDIF
            ENDDO
            *****
        ENDDO
    ENDDO
END SUBROUTINE SIEDEL
```

The missing segment in the program indicated by ***** is,

a) X(I)=C(I)+SUM b) X(I)=C(I)-SUM

c) X(I)=(C(I)+SUM)/A(I,I) d) X(I)=(C(I)-SUM)A(I,I)

25) What is the result of the following C program

```
int main(){
    int i, sum=0;
    for(i=0;i<25;i++){
        if(i>10) continue;
    }
    printf(”%d\n”,sum);
    return 1;
}
```

a) 25 b) 45

c) 55

d) 325

26) Consider the following C code

```
int x=1,y=5,z;
z=x++<<--y;
```

a) $2, 4, 16$

b) $2, 4, 32$

c) $2, 4, 64$

d) $1, 5, 32$

27) A two dimensional array is declared *int num*[3][3]. Then the result of expression $*(num + 1)$ is

a) The value of *num*[1][0]

b) The value of *num*[0][1]

c) The address of *num*[1][0]

d) The address of *num*[0][1]

28) A C function named $func$ is defined as follows is

```
int func(int a, int b){
    if((a==1)||(b==0)||(a==b))return 1;
    return func(a-1,b)+func(a-1,b-1);
}
```

What is the result $func\,(4, 2)$

a) 12

b) 6

c) 3

d) 1

Common Data for Questions 29 and 30:
The following table gives the values of a function f at three distant points

x	0.5	0.6	0.7
$f\,(x)$	0.4794	0.5646	0.6442

29) The value of $f'\,(x)$ at $x = 0.5$ accurate upto two decimanl points, is

a) 0.82

b) 0.85

c) 0.88

d) 30.91

30) The value of $f(x)$ at $x = 0.55$ obtained using Newton's interpolation formula, is

a) 0.5626

b) 0.5227

c) 0.4847

d) 0.4749

Statement for Linked Answer Questions 31 and 32:
A modified Newton-Raphson method is used to find the roots of an equation $f(x) = 0$ which has multiple zeros at some point $x = p$ in the interval $[a, b]$. If the multiplicity M of the root is known in advance, an interative procedure for determining p is given by,

$$p_{k+1} = p_k - M\frac{f(p_k)}{f'(p_k)} \text{for} k = 0, 1, 2, \ldots$$

31) The equation $f(x) = x^3 - 1.8x^2 - 1.35x + 2.7 = 0$ is known to have a multiple root in the interval $[1, 2]$. Starting with an initial guess $x_0 = 1.0$ in modified Newton-Ralphson method, the root, correct upto 3 decimal places is,

a) 1.500

b) 1.200

c) 1.578

d) 1.495

32) The root of derivative of $f(x)$ in the same interval is,

a) 1.500

b) 1.200

c) 1.578

d) 1.495

Statement for Linked Answer Questions 33 and 34:
The values of a function $f(x)$ at four discrete points are as follows,

x	0	1	3	4
$f(x)$	-12	0	6	12

33) The function may be represented by a polynomial $P(x) = (x - a)R(x)$, where $R(x)$ is a polynomial of degree 2, obtained by Lagrange's interpolation and a is a real constant. The polynomial $R(x)$ is,

a) $x^2 + 6x + 12$

b) $x^2 + 6x - 12$

c) $x^2 - 6x - 12$

d) $x^2 - 6x + 12$

34) The value of the derivative of the interpolated polynomial $P(x)$ at the position of its real is

a) -6

b) -4

c) 6

d) 7