



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 decimal 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 iterative procedure for determining  $p$  is given by,

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

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-Raphson 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)  $7$