MDE/M-20　　　　**4667**

COMPUTER PROGRAMMING (theory)

MM-409

Time : Three Hours]　　　　　　[Maximum Marks : 80

Note : Attempt *one* question from each of the Sections I to IV. Section V is compulsory.

Section I

1. (a) Write a source program to convert spherical polar coordinates into the Cartesian form. **4**

    (b) Write a source program to compute the expression :

    $z = \log_e x + \sin(56^\circ) + 2\sqrt{(xy)},$ for given values of x, y. **5**

    (c) Write a source program to compare diagonal and semi-perimeter of a rectangle with given sides. Comment, when diagonal can be longer. **7**

2. (a) Derive the condition for three points in a plane to be collinear. Write a source program to check the co-linearity for three given point on plane. **8**

(b) Give example to explain the necessity of EXIT and CYCLE in a count-controlled loop structure. Write source program for this example. **8**

Section II

3. (a) Write a FORTRAN-90 program to compute the dot product of two given vectors (x_1, x_2, x_3) and (y_1, y_2, y_3) using a subroutine subprogram. **4**

(b) Explain the options allowed for case_value field in SELECT CASE construct. **4**

(c) Using SELECT CASE construct, write a source program to compute simple interest on a given amount at variable rate, given by $r = 9.5\%$, if $a >= 5000$ and $t < 6$; $r = 11\%$, if $a >= 5000$ and $t >= 6$; $r = 7.5\%$ else. **8**

4. (a) Write a FORTRAN-90 program to invert the order of elements in given linear array. **5**

(b) Write different input statements to read a 3×4 matrix of real values. **4**

(c) Write source program to check a given matrix to be skew symmetric. **7**

Section III

5. (a) Discuss the notable points, which should be kept in mind while using FORMAT specifications for PRINT statements. **8**

(b) Use example program to illustrate the difference in the working of ADJUSTR() & TRIM() functions. **4**

(c) Discuss the working of in-built functions in FORTRAN-90, which are used to compare strings.

4

6. (a) Illustrate the use of MODULE in a source program to evaluate a given polynomial through a subprogram. **6**

(b) Using a MODULE, write source program to compute $\int_1^2 f(x)dx$ for $f(x) = \sin^{-1}(x) - \ln(x)$. **10**

Section IV

7. (a) In a generalized syntax for opening a sequential file, explain the various options available in FOTRAN-90. **8**

(b) Explain the meaning of various integer values used in the following statement :

READ (10, 11, REC=marks, ERR = 12) roll, name, marks.   **4**

(c) Use an example to explain the declaration and assignment for pointer to a derived data type.   **4**

8. (a) Write a source program to create a linear linked list for a given set of characters.   **8**

(b) Explain the use of NAMESLIST in input/output statements of FORTRAN-90 program.   **4**

(c) Using complex data type, write source program to solve a quadratic equation with complex coefficients.

4

Section V

9. (a) What are requirements for a sequence of characteristics to be a valid identifier ?

(b) Give example of FORTRAN-90 statement, where the function INT() can be used to get the outcome of the function MOD().

(c) Write a function subprogram to compute the magnitude of a given vector (x_1, x_2, x_3).

(d) Explain the use of ALLOCATE and DEALLOCATE in a FORTRAN-90 program.

(e) Explain the working of functions ACHAR() and IACHAR() in FORTRAN-90 program.

(f) Give an example of using a derived data type into another.

(g) Explain the meaning of the following statement of FORTRAN-90 :

INQUIRE(UNIT = 10, OPENED=op_stat, NAME-file0)

(h) Describe the working of the function ASSOCIATED in FORTRAN-90. **8×2=16**