This question paper contains 4 printed pages.

8476 *Your Roll No.* .....

B. Tech. (E) / I **A**

PAPER : EEE/EEC–106— NUMERICAL TECHNIQUES AND COMPUTER PROGRAMMING

Time : 3 hours *Maximum Marks* : 70

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all, selecting at least two questions from each Part. All questions carry equal marks. Assume missing data, if any.

PART A

1. Fill in the blanks:

(*a*) Real variables that have not been explicitly declared must start with one of the letters ..... .

(*b*) 1.0/3/2 ..... evaluate to the same as 1.0/(3/2).

(*c*) An END statement is the ..... end of a program and it must be the ..... statement of a program.

(*d*) X=Y=Z is ..... an arithmetic assignment statement.

(*e*) All declaration statements must appear before any ..... statement.

(*f*) A logical variable can have a value either ..... or ..... .

P. T. O.

(*g*) The last statement of a DO loop must be a ..... statement.

(*h*) The statement to which control is transferred by a GOTO statement must have a ..... .

(*i*) In a FORTRAN statement, columns one through five are used for ..... , column six is used for ..... and the actual statement must be placed within columns ..... through ..... .

(*j*) A FORTRAN variable must not contain more than ..... characters and the first character must be an ..... .

(*k*) 1.6 E–25 is ..... as FORTRAN real constant.

(*l*) DIMENSION statement must be placed before any ..... statement in a program unit.

(*m*) For I=5, J=6, A=J/I and B=I/J, I=A+B+A*J/I*4+B will evaluate to 14

2. Thirty five numbers are read and are stored in a subscripted variable. WAP in FORTRAN to print them in the reverse order. 14

3. (*a*) Draw a flowchart to find the biggest number from given 50 numbers. 8

(*b*) How many records are needed so that each FORMAT specification associated with the following READ statement is executed completely:

READ 65, (A(K), K=1,30)
65 FORMAT (8 F8.2)
65 FORMAT (3 F8.2)
65 FORMAT (3 F8.2 \\)
65 FORMAT (4 F8.2 \ 2 F8.2) 6

4. In a class of 90 students marks of each student in five subjects are given. WAP in FORTRAN to find the % of each student when maximum marks in each subject are 100. 14

PART B

5. (*a*) Calculate by Simpson's one-third rule an approximate value of:

$$\int_{-3}^{3} x^4\,dx$$

by taking 7 equidistant ordinates.

(*b*) Use the Runge-Kutta method to calculate the value of y at $x=0\cdot1$, to five places of decimal, after a single step of $0\cdot1$ if:

$$\frac{dy}{dx}=0\cdot31+0\cdot25y+3x^2,$$

and $y=0\cdot72$ when $x=0$. 14

6. (*a*) Show that:

(*i*) $\sum_{k=0}^{n-1}\Delta^2 f_k=\Delta f_n-\Delta f_0$

(*ii*) $\Delta^r y_k = \nabla^r y_{k+r}$

(*b*) Find U_{28} given that $U_{20}=$ 49225, $U_{25}=48316$, $U_{30}=47236$, $U_{35}=45926$, $U_{40}=44306$ by Stirling's formula. 14

7. (*a*) Express $x^4-12x^3+42x^2-30x+9$ in factorials and their differences.

(*b*) Find the first derivatives of the function $y=f(x)$ tabulated below at the point $x=1\cdot1$

x:	1	1.2	1.4	1.6	1.8	2.0
$f(x)$	0.00	0.1280	0.5440	1.2960	2.4320	4.0000

14

8. (*a*) Applying Newton's method thrice, find the real root near to 2 of the equation $x^4-12x+7=0$.

(*b*) Given $U_0+U_8=1\cdot9243$

$U_1+U_7=1\cdot9590$

$U_2+U_6=1\cdot9823$

$U_3+U_5=1\cdot9956$

Find U_4. 14