M. Sc. (Sem. IV) Examination

April / May - 2018

Physics : CT - 11

(Numerical Analysis and Computer Programming)
(Old Course)

Faculty Code : 003
Subject Code : 020401

Time : $2\frac{1}{2}$ Hours]　　　　　　　　　　　　　[Total Marks : **70**

1　Attempt any **seven** :　　　　　　　　　　　　　　**14**

(a)　Solve the following Set of linear equations using method of elimination : $8x - 15y = 1$, $3x + 2y = 8$.

(b)　Expand $(x-1)^5$, using Pascal triangle rule.

(c)　Find the value of Δu_x for $u_x = e^x$ and $u_x = \log x$.

(d)　How one can define Fourier Series ?

(e)　What do you mean by interpolation and extrapolation of experimental data ?

(f)　What are the different types of 'IF' statement ?

(g)　Briefly explain the importance of flow chart.

(h)　Discuss 'implied do loop' and its implementation.

(i)　Describe how the integer variable name can be written ?

(j)　Name the file structure supported by FORTRAN.

2　Answer any **two** :　　　　　　　　　　　　　　　　**14**

(a)　By the method of least squares obtain a relation of the form : $y = ab^x$ for the following data.

x	2	3	4	5	6
y	8.3	15.4	33.1	65.2	127.4

(b)　Solve the system of equations : $5x - 7y = 36$ and $3x + 2y = 3$ by (i) Direct method (ii) Cramer's rule.

(c)　The following data give I, the indicated horse power and V, the speed developed by a ship. Find I when $V = 9$, using Newton's forward interpolation formula.

V	8	10	12	14	16
I	1000	1900	3250	5000	8950

3 (a) Compute the integral $\int_{-1}^{1} e^x \, dx \, dx$ applying Simpson's **7**
$\dfrac{1}{3}$ rule.

(b) Given $y' = x^2 - y$, $y(0) = 1$ find $y(0.1)$ and $y(0.2)$ using **7**
Range-Kutta method of fourth order.

OR

3 (a) Draw and describe the symbols used in flow chart. **7**

(b) Generate the algorithm and draw the flow chart to **7**
find the largest among the three numbers.

4 Attempt any **two** : **14**

(a) Define arithmetic expressions. Write and explain the
rules for real and integer expressions.

(b) Using logical IF statement, Write a FORTRAN program
to calculate the mean weight of boys and girls.

(c) Briefly discuss the FORMAT function. List and explain
the use of various FORMAT specifiers with appropriate
examples.

5 Write notes on any **two** : **14**

(a) Application of Fourier Series analysis.

(b) Using IF Statement, Write the FORTRAN program to
find the sum of digits of a given number.

(c) Solve $y' = 3x^2 + y$ in $0 \le x \le 0.3$ by using Euler's method
and modified Euler's method taking $b = 0.1$ given that
$y(0) = 4$.

(d) Write the general statement for the 'DO'. Discuss
'implied do loop'. Discuss the rule to be follows using
'DO' loop.

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