

## POST-GRADUATE COURSE

Term End Examination — December, 2014 / June, 2015

## MATHEMATICS

Paper - 4B : Computer Programming & Its  
Application To Numerical Analysis

Time : 2 Hours

Full Marks : 50

( Weightage of Marks : 80% )

Special credit will be given for accuracy and relevance  
in the answer. Marks will be deducted for incorrect  
spelling, untidy work and illegible handwriting.

The marks for each question has been  
indicated in the margin.

## [ NEW SYLLABUS ]

( For Enrolled July, 2012 Batch onwards )

Answer Question No. 1 and any *four* from the rest.1. Answer any *five* questions :  $2 \times 5 = 10$ 

- Explain decision box used in flow chart.
- Write an algorithm to find the maximum among three numbers.
- What are the rules for naming a C variable ?
- What do you mean by symbolic name ?  
What is the difference between symbolic name and variable ?
- What are the advantages to use double variable ?
- Explain %f format specification.

- Explain *do-while* loop using flow chart.
- Identify the errors, if any.

```
float x, y;
scanf ( "%f", &x );
y/4 = x*x + 5;
printf ( "%f %d", x, y );
```

- Explain 'switch' statement.
  - Write a program to compute the value of the Legendre polynomial  $P_n(x)$  of degree  $n$

defined by

$$P_1(x) = x$$

$$P_2(x) = \frac{1}{2}(3x^2 - 1)$$

$$P_3(x) = \frac{1}{2}(5x^3 - 3x)$$

$$P_4(x) = \frac{1}{8}(35x^4 - 30x^2 + 3)$$

for a given  $n$  ( = 1, 2, 3, 4 ) and  $x$ .

- Express the following algebraic expressions into their equivalent C expressions :

$$\text{i) } \left( \frac{\sin x + 1 \cdot 2e^x}{2 \cdot 5 \times 10^{-25} (x + y)} \right)^{\frac{1}{3}}$$

$$\text{ii) } \log_e | x^8 + y^{1/2} | + \sqrt{x^3 + 8}.$$

2 + 5 + 3

3 PGMT-4B [PT/10/IVB (NEW)]

3. a) Explain the 'comma' operator used in for loop.
- b) Assume that at the beginning of each of the following program segments  $M = 5$  and  $N = 15$ . What will be the final values of  $N$  and  $M$  after the execution of each segment ?
- i) `if ( m < n ) n = n + 5;  
n + = 3;`
- ii) `if ( 2 * m == n ) goto 150;  
n++;  
goto 120;  
150 : n = m;  
120 : n += 5;`
- c) What is an array ? Explain how an array variable is different from an ordinary variable.  $2 + 5 + 3$
4. a) What is function ? List out the advantages and disadvantages of using function. How a function is declared within a program ?
- b) What are the difference between built-in function and user-defined function ?
- c) Write a function to compute the value of a determinant of order 2 and use it to find the value of a determinant of order 3.  $3 + 2 + 5$

PGMT-4B [PT/10/IVB (NEW)] 4

5. Write a program to solve a system of linear equations with  $n$  variables and  $n$  equations using Gauss-Jacobi iteration method. 10
6. a) Write an algorithm to evaluate a postfix expression.
- b) What do you mean by a linked list ? Write algorithms to insert a node to the linked list and to remove a node from the linked list.  $5 + 5$
7. a) What is a structure ? How does a structure differ from an array ? How is an array of structures initialized ?
- b) What is meant by 'the address of a memory cell' ? How are addresses usually numbered ?
- c) How is a pointer variable declared ? What is the purpose of the data type included in the declaration ?  $4 + 3 + 3$
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