



**AF-3506**

M.Sc. (Final)  
Term End Examination, 2017-18

**PHYSICS**

Paper - II (A)

Numerical Methods and Programming

*Time : Three Hours] [Maximum Marks : 100*  
*[Minimum Pass Marks : 36*

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**Note** : Answer **five** questions in all, selecting at least **two** questions from each Section. All questions carry equal marks.

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**Section - A**

1. (a) Explain the bisectional method for finding a real root of the equation  $f(x) = 0$  and give graphical representation of the method.  
(b) Obtain a root, correct to three decimal places of the following equation using bisectional method :  
$$x^3 + x^2 - 1 = 0$$

( 2 )

2. (a) Describe Srinivas Ramanujan iterative procedure to determine smallest root of equation  $f(x) = 0$ .  
(b) Find the smallest root of equation using Ramanujan procedure :

$$f(x) = x^3 - 9x^2 + 26x - 24 = 0.$$

3. (a) Describe Trapezoidal rule and Simpson's  $\frac{3}{8}$  rule for numerical integration.  
(b) Evaluate  $\int_0^{\pi} x \cdot \sin x \, dx$  using Trapezoidal rule.

4. (a) Explain solution of ordinary differential equation by predictor-corrector method.  
(b) Use Runge-Kutta fourth order formula to find  $y(0.2)$  and  $y(0.4)$  given that

$$y^1 = \frac{y^2 - x^2}{y^2 + x^2}, \quad y(0) = 1$$

5. (a) Solve the following system of equation using Gaussian elimination method :

$$2x + y + z = 10$$

$$3x + 2y + 3z = 18$$

$$x + 4y + 9z = 16$$

(3)

- (b) Use the iterative method to find smallest eigenvalue of matrix :

$$A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

### Section - B

6. (a) What is a flow chart ? How is it useful for the development of a computer programme.  
(b) Describe C Programming Language and explain type of constant, character set variables and C keywords.
7. (a) Describe Loops for repeat of a program using for-statement, while-statement, do-while statement.  
(b) Describe array and write a program in 'C' to print matrix.
8. (a) Write a program to select a data from array in 'C' language, also give flow chart.  
(b) What is Library function ? Explain suppression character.
9. (a) What is an operator give its type.  
(b) Give in detail local and global variables.

( 4 )

**10.** Write short notes on any **two** of the following :

- (a) Write Newton-Raphson Integration Method for C-programming
  - (b) If-statement and If-else statement
  - (c) Data input and output control
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