



K16P 0208

Reg. No. : .....

Name : .....

**Fourth Semester M.Sc. Degree (Regular/Supplementary/Improvement)  
Examination, March 2016  
(2014 Admn.)  
PHYSICS**

**PHY4C15 : Numerical Technique and Probability**

Time : 3 Hours

Max. Marks : 60

**SECTION – A**

Answer **any two** :

1. a) What do you understand by Chi-square distribution ? Discuss the Chi-square test of goodness of fit of a theoretical distribution to an observed frequency distribution.

OR

b) Explain with theory Newton-Raphson method. Obtain the convergence. What are the limitations of this method ?

2. a) Elucidate the Simpson's one third rule and 3/8 rules for numerical integration.

OR

b) i) Obtain the Euler's method of finding an approximate solution of a differential equation.

ii) Use Runge-Kutta method of the fourth order to find  $y(0.1)$ , given that

$$\frac{dy}{dx} = \frac{1}{(x+y)}, \quad y(0) = 1.$$

(2×12=24)

**SECTION – B**

Answer **any four**. 1 mark for Part a), 3 marks for Part b), 5 marks for Part c).

3. a) What is the chance that a non-leap year should have fifty-three Sundays ?

b) State and prove multiplication theorem of probability.

c) Calculate the probability of picking a card that was a heart or a spade. Comment on your answer.

P.T.O.



4. a) What is Normal distribution ?  
 b) Define Poisson Distribution and state the conditions under which this distribution is used.  
 c) Consider a simple trial of tossing a perfectly round and balanced coin six times. Then the probability of getting (i) exactly three heads (ii) at least three heads (iii) not more than two heads.
5. a) What is transcendental equation ? Give examples.  
 b) Give an account on Regula-Falsi method of finding the real root of an equation.  
 c) Find a root of the equation  $x^3 - 4x - 9 = 0$ , using the bisection method correct to - three decimal places.

6. a) Why is Trapezoidal rule so called ?  
 b) Write a short note on forward and backward differences.  
 c) Briefly explain the error propagation in a difference table.

7. a) What do you mean by linear interpolation ?  
 b) Obtain Newton's forward interpolation formula for equal intervals.  
 c) Use Lagrange's interpolation formula to find the value of  $y$  at  $x = 6$  from the following data :

x	3	7	9	10
y	168	120	72	63

8. a) What is curve fitting ?  
 b) Briefly explain Milne's method, to find a solution of the differential equation.

- c) Using Euler's method to solve  $\frac{dy}{dx} = 1 + xy$  with  $y(0) = 2$ . Find  $y(0.1)$ ,  $y(0.2)$  and  $y(0.3)$ .

(4x9=36)