

TDC Odd Semester Exam., 2020  
held in July, 2021

PHYSICS  
( Honours )

( 3rd Semester )

Course No. : PSHS-302

( Computational Physics )

Full Marks : 35  
Pass Marks : 12

Time : 2 hours

*The figures in the margin indicate full marks  
for the questions*

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. (a) State and prove the theorem of total probability. 1+2=3
- (b) A card is drawn at random from a standard pack of 52 playing cards. What is the probability that the card is—
- (i) either a king or a queen;
- (ii) either a red card or an ace? 2+2=4

2. (a) State and prove the theorem of compound probability. 1+2=3
- (b) Find the expression for mean and standard deviation of binomial distribution. 4

UNIT—II

3. Define systematic error. Explain different types of systematic errors with example. 1+6=7
4. (a) What is random error? How it can be eliminated? 2
- (b) What are meant by absolute error and relative error? 2
- (c) The length and breadth of a field are measured as (200 ± 5) m and (100 ± 4) m respectively. What is the area of the field? 3

UNIT—III

5. (a) Starting from general quadrature formula, derive Simpson's  $\frac{1}{3}$ rd rule. 4

( 3 )

- (b) Using Simpson's  $\frac{1}{3}$ rd rule, evaluate the approximate value of

$$\int_0^1 \frac{dx}{x}$$

correct to three decimal points and taking  $h = 0.25$ . 3

6. (a) Explain the method of solving algebraic equations by bisection method. 3

- (b) Find the real root of the equation

$$x^3 - 9x + 1 = 0$$

up to 5th approximation. 4

UNIT—IV

7. (a) Explain Picard's method of successive approximation for solving non-linear differential equation. 3

- (b) Use Picard's method to find the approximate value of  $y$ , when  $x = 0.2$  for the given differential equation

$$\frac{dy}{dx} = x + y$$

with  $y_0 = 1$ . 4

( 4 )

8. (a) Explain Runge-Kutta method for solving non-linear equation up to 1st and 2nd order. 4

- (b) Apply RK 2nd order method to find an approximate value of  $y$ , when  $h = 0.2$ . Given that

$$\frac{dy}{dx} = x + y \text{ and } y = 1$$

when  $x = 0$ . 3

UNIT—V

9. (a) What are meant by algorithm and flowchart? 2

- (b) Write a computer program in C or FORTRAN to find the roots of a quadratic equation. 5

10. (a) Give a brief introduction to operating system. 3

- (b) Write an algorithm and draw a flowchart to add two numbers. 4

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