



K24P 1111

Reg. No. : .....

Name : .....

**Second Semester M.Sc. Degree (C.B.C.S.S. – OBE-Regular)**  
**Examination, April 2024**  
**(2023 Admission)**  
**PHYSICS**

**MSPHY02C10/MSPHN02C10 : Mathematical Physics – II**

Time : 3 Hours

Max. Marks : 60

**SECTION – A**

Answer **any 5**. **Each** one carries **3** marks.

1. State and derive Cauchy's integral theorem.
2. State and prove Heaviside's Shifting Theorem (Second Translation Property).
3. Set up a Newton iteration for computing the square root of the number two.
4. Explain Poisson distribution with two examples.
5. Explain Group, subgroup and cyclic group.
6. What do you mean by absolute and conditional convergence ? **(5×3=15)**

**SECTION – B**

Answer **any 3**. **Each** one carries **6** marks.

7. State Cauchy's Root test for convergence of series.
8. Evaluate inverse Laplace transform of  $\frac{5s + 3}{(s - 1)(s^2 + 2s + 5)}$ .
9. Explain the fixed-point iteration of the equation  $f(x) = x^2 - 3x + 1 = 0$ .
10. Explain the normal distribution, draw the curve and its four features.
11. Obtain Laplace transform of rectangular wave given. **(3×6=18)**

P.T.O.



## SECTION – C

Answer **any 3**. Each one carries **9** marks.

12. a) State and derive Cauchy's integral formula.

b) Use Cauchy's integral formula to evaluate  $\int_c \frac{z}{(z^2 - 3z + 2)} dz$  where  $c$  is the circle  $|z - 2| = \frac{1}{2}$ .

13. State and prove convolution theorem for Laplace transform. Using convolution theorem, evaluate inverse Laplace transform of  $\frac{s^2}{(s^2 + a^2)(s^2 + b^2)}$ ,  $a^2 \neq b^2$ .

14. Explain the theory of Simpson's rule and evaluate the integral

$$J = \int_0^1 \exp(-x^2) dx, \text{ with } 2n = 10 \text{ and estimate the error.}$$

15. Explain the  $\chi^2$  test, regression analysis and correlation analysis.

16. Find the two eigenvalues and two normalized eigenvectors of the matrix.

(3×9=27)