

OCTOBER 2012

P/ID 40001/PPHA

Time : Three hours

Maximum : 100 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Are $\sin x$ and $\cos x$ orthogond to each other in the internal $(0, \pi)$.
2. What are linearly independent functions?
3. What is a linear second order differential equation?
4. What is a non essential pola?
5. State Canchy's Residue theorem.
6. What is contour integration?
7. What is the Laplace transform of e^{4x} ?
8. What is Fourier transform?
9. What is a subgroup?
10. What is a class?

PART B — (5 × 6 = 30 marks)

Answer ALL questions.

All questions carry equal marks.

11. (a) Construct the orthonormal functions of $1, X, X^2$ in the interval $[0, 1]$.

Or

- (b) Verify Schwarz inequality with the functions $\sin x, X^2 t \cos 2X$.

12. (a) Find the value of $L_2(\pm 1)$.

Or

- (b) Are e^x, e^{-x} and $\cosh x$ linearly independent.

13. (a) $J, X^2 + XY^2 + X^2Y + i(XY - 3Y^2)$ analytic.

Or

- (b) Expand a function in terms of Laurent's series.

14. (a) Find the Laplace transform of $\sin x, \frac{1}{x^2} + x^2$.

Or

- (b) Find the Fourier transform of $f(x) = \begin{cases} x & -1 \leq x \leq 0 \\ 0 & |x| > 0. \end{cases}$

15. (a) Write down the multiplication table of C_{3n} group .

Or

- (b) Write down the multiplication table of D_{3n} group .

PART C — (5 × 10 = 50 marks)

Answer ALL questions.

All questions carry equal marks.

16. (a) State Gram-Schmitt process of orthonormal with a example.

Or

- (b) List the property of Linear space.

17. (a) Show that Hermite Polynomials are orthogonal to each other.

Or

- (b) How will you check if a point is a singular point of a second order differential equation? Explain with an example.

18. (a) State and prove Cauchy's integral theorem.

Or

(b) Derive the Cauchy-Riemann conditions for a complex function to be analytic.

19. (a) Find the Laplace transform of $\exp(4 * t) + t^2 \sin t$.

Or

(b) Find the Fourier transform of e^{-2x^2} .

20. (a) State and prove great orthogonality theorem.

Or

(b) Construct the multiplication table and character table for the group C_{3V} .