

AJAY KUMAR GARG ENGINEERING COLLEGE, GHAZIABAD**Department of Applied Science & Humanities****Pre-University Test**

Course: B. Tech.

Session: 2024-25

Subject: Engineering Mathematics – II

Max Marks: 70

OBE Remarks:Semester: IInd

Section: (S1-S9&S11-S20)

Sub. Code: BAS203

Time: 3 hrs.

Q. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CO No.	1	1	2	2	3	4	5	2	2	3	1	1	4	4	5	5	3
Bloom's Level	L1	L3	L1	L1	L4	L5	L4	L3	L5	L3	L1	L4	L2	L5	L2	L5	L5
Weightage CO4: 16										Weightage CO5: 16							

Note: Answer **all** the sections.**Section-A****A. Attempt all the parts.****(7 X 2 =14)**1/ Find P.I. of $(D + 1)^3 y = 2e^{-x}$ 2. Determine the differential equation whose set of independent is $\{x, xe^x\}$.3/ Find the Laplace of $u(t - 2) \cdot (t - 2)$.4. Find the Laplace transformation of $F(t) = \begin{cases} t, & 0 < t < 4 \\ 5, & t > 4 \end{cases}$ 5. Test the convergence or divergence of whose n^{th} terms is $\left[\sqrt{n^2 + 1} - \sqrt{n^2 - 1} \right]$.6/ If $f(z) = -x^2 + xy + y^2 + i(ax^2 + cy^2 + bxy)$ is analytic then find the value of a, b and c .7/ Discuss the singularity of $f(z) = \sin\left(\frac{1}{z-a}\right)$.**Section- B****B. Attempt any three.****(3 X 7=21)**8. Solve the Differential equations by Laplace transformation $y'' + y' - 2y = t$, $y(0) = 1$, $y'(0) = 0$.9/ Find the Laplace transformation of $L\left[\frac{\sin 3t \cdot \cos t}{t}\right]$.10. Test the series $\frac{14}{1^3} + \frac{24}{2^3} + \frac{34}{3^3} + \dots$ 11. Solve $\frac{d^2 x}{dt^2} + y = \sin t$, $\frac{d^2 y}{dt^2} + x = \cos t$.12. Use the variation of parameter method to solve the differential equation $(x^2 D^2 - 4xD + 6)y = \sin(\log x)$

Section- C

C. Attempt all the parts.

(5 X 7 = 35)

13. Attempt any one.

(a) If $u + v = \frac{2 \sin 2x}{e^{2y} + e^{-2y} - 2 \cos 2x}$ and is an analytic function of $z = x + iy$, find $f(z)$.

(b) Show that $f(z) = \sin z$ is Holomorphic everywhere and also prove the real part of $f(z)$ is Harmonic.

14. Attempt any one.

(a) Examine the nature of the function $f(z) = \begin{cases} \frac{xy^2(x+iy)}{x^2+y^4}, & z \neq 0 \\ 0, & z = 0 \end{cases}$ in the region including the origin

(b) Find a bilinear transformation which maps the points $i, -i, 1$ of the z -plane into $0, 1, \infty$ of the w -plane respectively.

15. Attempt any one.

(a) Expand the $f(z) = \frac{1}{(z+1)(z+3)}$ in the regions (i) $|z| < 1$ (ii) $1 < |z| < 3$ (iii) $|z| > 3$

(b) Use Cauchy Integral formula Evaluate $\int_C \frac{z}{z^2 - 3z + 2} dz$, Where C is the circle $|z - 2| = \frac{1}{2}$.

16. Attempt any one.

(a) Verify Cauchy integral theorem for $f(z) = z^2$ in the domain $1 + i, 1 - i, -1 + i$ and $-1 - i$.

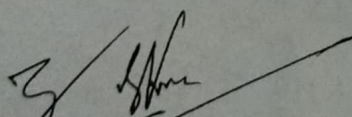
(b) Evaluate the integral $\int_C \left[\frac{\cos \pi z^2 + \sin \pi z^2}{(z+1)(z+2)} \right] dz$ by using Cauchy's Residue theorem integration.

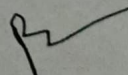
Where C is the circle $|z| = 3$.

17. Attempt any one.

(a) Expand $f(x) = x \sin x, 0 < x < 2\pi$ as a Fourier series.

(b) Find the Half range cosine series for the function $f(x) = \sin\left(\frac{\pi x}{l}\right), 0 < x < l$.


Faculty Sign


HoD Sign