Printed page:2

Subject Code: AAS0301A

Roll No: | | | | | | | | | | |

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech (CSE/CS/IT)

(SEM. III SESSIONAL EXAMINATION –I) (2021-2022)

Subject Name: Eng. Mathematics III

Time: 1.15Hours [SET-A] **Max. Marks:30**

General Instructions:

- All questions are compulsory. Answers should be brief and to the point.
- This Question paper consists of 2 pages & 5 questions.
- It comprises of three Sections, A, B, and C. You are to attempt all the sections.
- Section A -Question No- 1 is objective type questions carrying 1 mark each, Question No- 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
- Section B - Question No-3 is short answer type questions carrying 5 marks each. You need to attempt any two out of three questions given.
- Section C -Question No. 4 & 5 Long answer type (within unit choice) questions carrying 6 marks each. You need to attempt any one-part *a* or *b*.
- Students are instructed to cross the blank sheets before handing over the answer sheet to the invigilator.
- No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.
- Blooms Level: *K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create*

		SECTION – A	**[8]**	**CO**	**Blooms level**
1.	**Attempt all parts**		**(4×1=4)**	**CO**	
	a.	$\lim_{z\to 0}\left(\frac{z}{\bar{z}}\right)^2$ (i) Limit exists (ii) Limit does not exist (iii) Limit exists and equal to 1 (iv) None of these	**(1)**	**1**	**K5**
	b.	If $f(z)=\frac{z}{z^2+9}$ then (i) $f(z)$ is continuous (ii) $f(z)$ is discontinuous at $z=\pm 3i$ (iii) $\lim_{z\to i}\frac{z}{z^2+9}=-\frac{i}{8}$ (iv) Both B & C	**(1)**	**1**	**K2**
	c.	Function $f(z)=z+2\bar{z}$ is (i) Analytic anywhere (ii) Not analytic anywhere (ii) Harmonic (iv) None of these	**(1)**	**1**	**K3**

	d.	For which value of p the function $f(z) = r^2 cos2\theta + ir^2 sinp\theta$ is analytic. (i) 2 (ii) -2 (iii) 5 (iv) None of these	(1)	1	K5
2.	**Attempt all parts**		(2×2=4)	CO	
	a.	Show that if $f(z)$ is analytic and $Re\,[f(z)] = constant$ then $f(z)$ is constant.	(2)	1	K3
	b.	Find the bilinear transformation which maps the points $z = 1, -1, i$ into the points $w = 0, 1, \infty$ respectively.	(2)	1	K5
		SECTION – B			
3.	**Answer any <u>two</u> of the following-**		[2×5=10]	CO	
	a.	Show that $f(z) = \sin hz$ is analytic in entire complex plane.	(5)	1	K3
	b.	Find the image of $\|z - 1\| = 1$ under the transformation $w = \frac{1}{z}$.	(5)	1	K5
	c.	In two-dimensional fluid flow, the stream function $\psi = tan^{-1}\frac{y}{x}$. Find the velocity potential φ.	(5)	1	K3
		SECTION – C			
4	**Answer any <u>one</u> of the following-**		[2×6=12]	CO	
	a.	Determine an analytic function $f(z)$ in terms of z whose real part is $\frac{\sin 2x}{\cosh 2y + \cos 2x}$.	(6)	1	K5
	b.	Show that the function $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2+y^2}, z \neq 0$ and $f(0) = 0$ is not analytic at $z = 0$. Although Cauchy Riemann equation are satisfied at origin.	(6)	1	K3
5.	**Answer any <u>one</u> of the following-**				
	a.	Determine an analytic function $f(z) = u + iv$ in terms of z if $u - v = \frac{e^{-y} - \cos x + \sin x}{\cosh y - \cos x}$ and $f\left(\frac{\pi}{2}\right) = \frac{3-i}{2}$.	(6)	1	K5
	b.	Find an analytic function $f(z)$ in terms of z if $Re[f'(z)] = 3x^2 - 4y - 3y^2$ and $f(1+i) = 0$ & $f'(0) = 0$.	(6)	1	K5