



16-09-2022

Roll No:

**BTech**  
**(SEM II) THEORY EXAMINATION 2021-22**  
**ENGINEERING MATHEMATICS-II**

Time: 3 Hours

Total Marks:100

Notes-

- Attempt all sections and assume any missing data.
- Appropriate marks are allotted to each question, answer accordingly.

SECTION -A	Attempt all of following questions in brief	Marks (10*2=20)	CO
Q.14(a)	Find the differential equation which represents the family of straight lines passing through the origin?	2	1
Q.14(b)	State the criterion for linearly independent solutions of the homogeneous linear nth order differential equation.	2	1
Q.14(c)	Evaluate $\int_0^1 \frac{x^2 - 2x + 1}{x^2 + 1} dx$ .	2	2
Q.14(d)	Find the volume of the solid obtained by rotating the ellipse $x^2 + 9y^2 = 9$ about the x-axis.	2	2
Q.14(e)	Test the series $\sum_{n=1}^{\infty} \frac{1}{n} \sin \frac{1}{n}$ .	2	3
Q.14(f)	Find the constant term when $f(x) = 1 +  x $ is expanded in Fourier series in the interval $(-3, 3)$ .	2	3
Q.14(g)	Show that $f(z) = z + 2z^2$ is not analytic anywhere in the complex plane.	2	4
Q.14(h)	Find the image of $ z - 2i  = 2$ under the mapping $w = \frac{1}{z}$ .	2	4
Q.14(i)	Expand $f(z) = e^{z^2(z-2)}$ in a Laurent series about the point $z = 2$ .	2	5
Q.14(j)	Discuss the nature of singularity of $\frac{z^2 - 3z}{(z-2)^2}$ at $z = a$ and $z = \infty$ .	2	5

SECTION -B	Attempt any three of the following questions	Marks (3*10=30)	CO
Q.20(a)	Solve: $\frac{2x^2}{3z} - \frac{2x}{3z} + 3x = e^{-z}$ , $\frac{2y^2}{3z} - 4\frac{2y}{3z} + 3y = \sin 2z$ .	10	1
Q.20(b)	Assuming $\Gamma'(1-n) = n \cot n\pi$ , $0 < n < 1$ , show that $\int_0^{\infty} \frac{x^{p-1}}{1+x} dx = \frac{\pi}{\sin p\pi}$ , $0 < p < 1$ .	10	2
Q.20(c)	Test the series $\frac{x}{1-x} + \frac{x^2}{1-x} + \frac{x^3}{1-x} + \frac{x^4}{1-x} + \dots$	10	3
Q.20(d)	If $f(z) = u + iv$ is an analytic function, find $f(z)$ in term of $z$ if $u - v = \frac{e^x \cos y + 1}{x^2 + y^2}$ when $f\left(\frac{1}{2}\right) = \frac{1}{2}$ .	10	4
Q.20(e)	Evaluate by contour integration: $\int_0^{2\pi} e^{-i\theta} \cos(n\theta + i \sin \theta) d\theta$ , $n \in \mathbb{Z}$ .	10	5