Reg. No.												

Question Paper Code	12537

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

Second Semester

Civil Engineering

(Common to Electronics and Communication Engineering, Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Mechanical Engineering, Mechanical and Automation Engineering & Computer and Communication Engineering)

20BSMA201 - ENGINEERING MATHEMATICS - II

(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

PART-A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	If $\varphi = 3xy - yz$, Find $grad\varphi$ at (1, 1, 1).	*2,K2,CO1*
2.	State Greens theorem.	*2,K1,CO1*
3.	Solve $(D^2+1)y = e^{-x}$	*2,K2,CO2*
4.	Solve $(x^2D^2 + xD)y = 0$.	*2,K2,CO2*
5.	Estimate the invariant points of the transformation $w = \frac{z-1}{z+1}$.	*2,K2,CO3*
6.	Show that $u = 2x - x^3 + 3xy^2$ is harmonic.	*2,K2,CO3*
7.	State Cauchy's integral theorem.	*2,K1,CO4*
8.	Define an isolated singularity and give an example.	*2,K2,CO4*
9.	Find Laplace transform of e^{-3t}.	*2,K2,CO5*
10.	State Convolution Theorem in Laplace Transform.	*2,K1,CO5*

PART - B (5 × 16 = 80 Marks)

Answer ALL Questions

11.	a)	(i) Find the angle between the surfaces $x^2 - y^2 - z^2 = 11$ and $xy + yz - zx = 18$ at the point (6, 4, 3).	*8,K3,CO1*
		(ii) Find the scalar potential, if the vector field. $\vec{F} = (x^2 + xy^2)\,\vec{i} + (y^2 + x^2y)\,\vec{j}$ is irrotational.	*8,K3,CO1*
		OR	
	b)	Verify Gauss Divergence theorem for $\vec{F} = (x^2 - yz)\vec{\imath} + (y^2 - zx)\,\vec{\jmath} + (z^2 - xy)\,\vec{k}$ taken over the rectangular parallelepiped bounded by $x = 0$, $y = 0$, $z = 0$ and	*16,K3,CO1*

$x = a, y = b,\ z = c.$

12. a) Solve $(D^2 + a^2)y = tanax$ by the method of variation of parameters. *16,K3,CO2*

OR

b) Solve $[(x+1)^2D^2 + (x+1)D + 1]y = 4\cos[log(x+1)]$. *16,K3,CO2*

13. a) (i) Determine the analytic function whose real part is $\frac{\sin 2x}{\cosh 2y - \cos 2x}$ *8,K3,CO3*

(ii) If $f(z)$ is an analytic function of z, then prove that $\nabla^2\ log\ |f(z)| = 0$. *8,K3,CO3*

OR

b) Find the bilinear transformation which maps $z = 1,0,-1$ into $w = 0, -1, \infty$ respectively. What are the invariant points of the transformation? *16,K3,CO3*

14. a) Evaluate $\int_0^{2\pi} \frac{d\theta}{(a+bsin\theta)} (a > 0, b > 0)$, using contour integration. *16,K3,CO4*

OR

b) Expand as Laurent's series of the function $\frac{z}{(z^2-3z+2)}$ in the regions (i) $|z| < 1$ (ii)$1 < |z| < 2$ (iii) $|z| > 3$. *16,K3,CO4*

15. a) Find the Laplace transform of the square- wave function of period 2 defined as $f(t)=\begin{cases} 1, when\ 0 < t < 1 \\ 0, when\ 1 < t < 2 \end{cases}$ and $f(t+2) = f(t)$), for all t. *16,K3,CO5*

OR

b) Solve the difference equation $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = e^{-t}$ with $y(0) = 1$ and $y'(0) = 0$, using Laplace transform. *16,K3,CO5*