Question Paper Code: R15A12HS01

R15

ANURAG Engineering College

(An Autonomous Institution)

I B.Tech II Semester supplementary Examinations, January-2025

MATHEMATICS - II

(COMMON TO ALL BRANCHES)

Time: 3 Hours **Max. Marks: 75**

Section – A (Short Answer type questions) (25 Marks)

Answer All Questions

		Course Outcome	B.T Level	Marks
1.	Find Laplace Transform of unit step function	CO1	L2	2M
2.	State and prove second shifting theorem in Laplace Transforms	CO1	L1	3M
3.	State and prove the symmetry of Beta function	CO2	L1	2M
4.	Show that $\Gamma\left(\frac{1}{2}\right)=\sqrt{\pi}$	CO2	L2	3M
5.	Write a short note on curl of a vector point function	CO3	L1	2M
6.	Write three vector point functions which are both solenoidal and irrotational	CO3	L2	3M
7.	State Gauss divergence theorem	CO4	L1	2M
8.	If C is a closed curve, then evaluate $\int_C \bar{r}.d\bar{r}$	CO4	L2	3M
9.	Write the Euler formulae in Fourier series expansion of $f(x)$ in $[c,c+2\pi]$	CO5	L1	2M
10.	Write half range Fourier sine series formula for a function in $(0,\pi)$	CO5	L1	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

11. A)	Evaluate $L^{-1}\left(\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right)$	CO1	L3	10M
	OR			
B)	Using Laplace Transform, solve $(D^2+4D+5)y=5, y(0), y'(0)=0$	CO1	L2	10M
12. A)	Prove that $B(m,n)=\frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ (m,n are positive real numbers)	CO2	L2	10M
	OR			
B)	Evaluate $\int_0^1 \frac{1}{\sqrt{1-x^4}}dx$ using Beta and Gamma functions	CO2	L3	10M
13. A)	Prove that $\nabla f(r)=\frac{f'(r)}{r}\bar{r}$ and hence deduce $\nabla \log r$	CO3	L2	10M
	OR			

B)	By changing the order of integration evaluate $\int_0^{\infty}\int_x^{\infty}\frac{e^{-y}}{y}dxdy$	CO3	L3	10M
14. A)	If $\overline{F} = 4xzi - y^2 j + yzk$ then evaluate $\int_S \overline{F}.\overline{N}dS$ where S is the cube bounded by $x = 0, x = a, y = 0, y = a, z = 0, z = a$	CO4	L2	10M
	OR			
B)	Verify Green's theorem in plane for $\oint_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the region bounded by $y = \sqrt{x}, y = x^2$	CO4	L2	10M
15. A)	Find the Fourier series of $f(x) = \lvert\sin x\rvert_{\text{in}}\ [-\pi, \pi]$	CO5	L3	10M
	OR			
B)	Obtain Fourier cosine series of $f(x) = x\sin x$ in $[0, \pi]$ and hence find the value of the infinite series $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \ldots\ldots\infty$	CO5	L2	10M