R15/R14

Question Paper Code: R15A12HS01/R14A12HS01

ANURAG Engineering College

(An Autonomous Institution)

I B.Tech II Semester Supplementary Examinations, June/July-2024

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.	Define Laplace transformation and explain its linear property.	CO1	L1	2M
2.	Find the Laplace transformation of $\frac{\cos at - \cos bt}{t} + t\sin at$.	CO1	L2	3M
3.	Show that $\beta(m,n) = \beta(n,m)$	CO2	L2	2M
4.	Evaluate $\int_0^\infty \sqrt[4]{x}\, e^{-\sqrt{x}}\, dx$.	CO2	L1	3M
5.	Find div F and curl F of F = grad$(x^3+y^3+z^3-3xyz)$.	CO3	L2	2M
6.	Change the order of integration in $\int_0^1 \int_{x^2}^{2-x} xy\ dx\ dy$ and evaluate the same.	CO3	L2	3M
7.	Find the work done in moving a particle in the force field $F = 3x^2 i + (2xz-y)j + zk$ along the straight line from $(0,0,0)$ *to* $(2,1,3)$.	CO4	L2	2M
8.	Evaluate Green's theorem for $\int_C [(xy+y^2)dx + x^2dy]$ where C is bounded the line $y = x$ *and the curve* $y = x^2$.	CO4	L2	3M
9.	State Dirichlet conditions for Fourier expansion of a function.	CO5	L1	2M
10.	Define even and odd function and Express $f(x) = x/2$, as a fourier series in the interval $(-\pi, \pi)$.	CO5	L1	3M

Section B (Essay Questions)

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

11. A)	Using convolution theorem find the inverse Laplace transformation of $\frac{s}{(s^2+1)\ (s^2+4)\ (s^2+9)}$.	CO1	L3	10M
	OR			
B)	Using Laplace Transformation solve the differential equation: $\frac{d^2y}{dt^2} + n^2y = a\sin(nt+a), y = Dy = 0\ at\ t = 0.$	CO1	L3	10M
12. A)	Show that $\beta(m,n) = \frac{\Gamma m\,\Gamma n}{\Gamma(m+n)}$	CO2	L3	10M
	OR			
B)	Establish Dirichlet's theorem $\iiint_V x^{l-1}\, y^{m-1}\, z^{n-1}\, dx\, dy\, dz = \frac{\Gamma l\,\Gamma m \Gamma n}{\Gamma(l+m+n+1)}$, where V is the volume of the region $x \geq 0, y \geq 0, z \geq 0$, and $,0 \leq x+y+z \leq 1$.	CO2	L3	10M
13. A)	Find the volume of the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2} = 1$.	CO3	L2	10M
	OR			
B)	Show that $\nabla^2 r^n = n(n+1)r^{n-2}$, wher where $r = x\,i + y\,j + z\,k$, and $r = \sqrt{x^2+y^2+z^2}$.	CO3	L3	10M

14. A)	Verify Stokes theorem for the vector field $F = (2x - y)i - y z^2 j - y^2 zk$ over the upper half surface of $x^2 + y^2 + z^2 = 1$,bounded by its projection on the xy-plane.	CO4	L3	10M
	OR			
B)	Verify Gauss Divergence theorem for $F = (x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$, taken over the parallelopiped $0 \le x \le a,\ 0 \le y \le b,\ 0 \le z \le c$,	CO4	L3	10M
15. A)	Find a Fourier series to represent $f(x) = x - x^2,\ from\ x = -\pi\ to\ x = \pi$.	CO5	L2	10M
	OR			
B)	Obtain the half range cosine series for $f(x) = \begin{cases} kx, & for\ 0 \le x \le l/2 \\ k(l - x), & for\ l/2 \le x \le l \end{cases}$ And find the sum of the series $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots \infty$.	CO5	L3	10M