Question Paper Code: R18A12HS01

R18

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.	Solve $(2x-y+1)dx+(2y-x-1)dy=0$	CO1	L3	2M
2.	Find Integration factor of non-exact DE $x^2ydx-(x^3+y^3)dy=0$	CO1	L1	3M
3.	Find Particular Integral of DE $(D^2+6D+9)y=2e^{-3x}$	CO2	L1	2M
4.	Find particular integration of $(D^2+1)y=Sinx\,Sin2x$	CO2	L1	3M
5.	Evaluate $\int_0^2\int_0^x e^{x+y}\,dy\,dx$	CO3	L1	2M
6.	Evaluate $\int_0^1\int_1^2\int_2^3 x\,y\,z\,dx\,dy\,dz$	CO3	L1	3M
7.	Prove that $div\,Curl\,\bar{f}=0$	CO4	L1	2M
8.	If $\bar{f}=(x+3y)\bar{\imath}+(y-2z)\bar{\jmath}+(x+pz)\bar{k}$ is a solenoidal vector then find value of p.	CO4	L1	3M
9.	State Green's theorem	CO5	L1	2M
10.	Compute the line integral $\oint_C (y^2dx-x^2dy)$ where C is the boundary of the triangle whose vertices are (1, 0) , (0, 1) & (-1, 0) in XY-Plane.	CO5	L2	3M

Section B (Essay Questions)

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

11. A)	Solve $x\frac{dy}{dx}+y=x^3y^6$	CO1	L3	10M
	OR			
B)	If the temperature of a body drops from 100^0C to 70^0C in 15 minutes, then find when the temperature will be 40^0C. If the temperature of the air is 30^0C.	CO1	L3	10M
12. A)	Solve $(D^2-2D+2)y=e^x+Cos\,x+x^2-5$	CO2	L3	10M
	OR			
B)	Solve $(D^2+4)y=Cosec\,2x$ by using the method of variation of parameters.	CO2	L3	10M
13. A)	Evaluate $\int\int(x+y)\,dx\,dy$ over the region in the positive quadrant bounded by the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$	CO3	L3	10M
	OR			
B)	Evaluate $\int_0^{log2}\int_0^x\int_0^{x+y} e^{x+y+z}\,dz\,dy\,dx$	CO3	L3	10M
14. A)	i) Find the directional derivative of $x^2yz+4xz^2$ at the point $(1,2,-1)$ in the direction of the normal to the surface $(x\,logz-y^2)$ at $(-1,2,1)$	CO4	L3	5M
	ii) Prove that $Curl\,(\bar{a}\times\bar{b})=\bar{a}\,div\bar{b}-\bar{b}\,div\bar{a}+(\bar{b}.\nabla)\bar{a}-(\bar{a}.\nabla)\bar{b}$			5M
	OR			
B)	i) Evaluate the angle between the normal vectors to the surface $xy=z^2$ at the points (4,1,2) and (3,3,-3).	CO4	L3	5M
	ii) Prove that $\nabla(r^n)=n\,r^{n-2}\,\bar{r}$			5M

15. A)	Evaluate $\iint_S \bar{F}.\bar{n}\,ds$ if $\bar{F} = yz\,\bar{\imath} + 2y^2\bar{\jmath} + xz^2\bar{k}$ and S is the surface of the cylinder $x^2 + y^2 = 9$ contained in the first octant between the planes z=0 and z=2.	CO5	L3	10M
	OR			
B)	Verify Gauss's Divergence theorem for $\bar{F} = (x^3 - yz)\bar{\imath} - 2x^2y\bar{\jmath} + z\bar{k}$ taken over the surface of the cube bounded by the planes x = y = z = a and coordinate planes.	CO5	L3	10M