Question Paper Code: R22A12HS01

R22

ANURAG Engineering College

(An Autonomous Institution)

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

ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(COMMON TO ALL BRANCHES)

Time: 3 Hours **Max.Marks:60**

Section – A (Short Answer type questions) (10 Marks)

Answer All Questions

		Course Outcome	B.T Level	Marks
1.	Find the integrating factor of $2xy\,dy-(x^2+y^2+1)\,dx=0$	CO1	L2	1M
2.	Find the orthogonal trajectories of $xy=c$	CO1	L2	1M
3.	Find the complementary solution of $(D^2-2D+1)y=0$	CO2	L2	1M
4.	Find the particular solution of $(D^2+2D+4)y=e^{3x}$	CO2	L2	1M
5.	Find $L[\sin t+\cos t]^2$	CO3	L2	1M
6.	State Convolution theorem	CO3	L1	1M
7.	If $\overline{F}=x^2yz\,\overline{i}+xy^2z\,\overline{j}+xyz^2\,\overline{k}$ then $div\,\overline{F}$ at $(1,0,0)$	CO4	L2	1M
8.	If $\phi=xyz$ then find $grad\,\phi$	CO4	L2	1M
9.	Evaluate $\int_{(0,0)}^{(1,1)} xdy+ydx$ along the straight-line y=x	CO5	L2	1M
10.	State Stoke's theorem	CO5	L1	1M

Section B (Essay Questions)

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

11. A)	Solve $\frac{dy}{dx}-\frac{\tan y}{1+x}=(1+x)e^x\sec y$	CO1	L3	10M
	OR			
B)	A Copper ring is originally at $80^0\ C$ and cools down to $60^0\ C$ in 20 minutes, the temperature air being $40^0\ C$. What will be the temperature of the ring after 40 minutes from original and also find when the temperature of the ring is $20^0\ C$	CO1	L3	10M
12. A)	Solve the differential equation $\frac{d^2y}{dx^2}+6\frac{dy}{dx}+9y=e^{-x}(x^2+2x+1)$	CO2	L3	10M
	OR			
B)	Solve the differential equation $\frac{d^2y}{dx^2}+y=\cos ec\,x$ by using method of variation of parameters	CO2	L3	10M
13. A)	Evaluate the integral $\int_0^\infty e^{-2t}\frac{\sin ht}{t}dt$ by using laplace transforms	CO3	L3	10M
	OR			
B)	Using convolution theorem, find $L^{-1}\left(\frac{s}{(s^2+a^2)^2}\right)$	CO3	L3	10M

14. A)	Find div $\overline{F}$ and curl $\overline{F}$ where $\overline{F} = grad\left(x^3+y^3+z^3-3xyz\right)$.	CO4	L3	10M
	OR			
B)	Prove that $\nabla.\left(r^n\,\overline{r}\right)=(n+3)r^n$	CO4	L3	10M
15. A)	Evaluate $\int_C F.d\overline{r}$ where $\overline{F} = xyi+(x^2+y^2)j$ along the straight line joining the origin and $(1,\ 2)$	CO5	L3	10M
	OR			
B)	Using Greens theorem in a plane, evaluate $\int_C[(xy+y^2)dx+x^2dy]$ Where C is the boundary of the region enclosed by $y=x$ and $y=x^2$	CO5	L3	10M