Question Paper Code: R18A12HS01

R18

ANURAG Engineering College

(An Autonomous Institution)

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

MATHEMATICS - II

COMMON TO CE, EEE, ME, ECE & CSE

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 an integrating factor of $(x^2 + y^2)\,dx - 2xy\,dy = 0$	CO1	L1	2M
2.	Find orthogonal trajectories of $y^2 = 4ax$.	CO1	L2	3M
3.	Find the complementary function of $\frac{d^4y}{dx^4} - y = 5 + x$	CO2	L1	2M
4.	Find the particular integral of $(D^2 + 4)y = 2e^x \sin x$	CO2	L1	3M
5.	Change the order of integration $\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dy\,dx$	CO3	L2	2M
6.	Find the value of $\int_0^{\frac{\pi}{4}} \int_0^1 r\,dr\,d\theta$	CO3	L1	3M
7.	If $\emptyset = x^2 y^2 z^2$, then find the value of grad$\emptyset$	CO4	L2	2M
8.	Find constants a, b, c. So that $\bar{V} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is irrotational.	CO4	L2	3M
9.	If $\bar{F} = (2x^2 - 3z)\hat{i} - 2xy\hat{j} - 4x\hat{k}$, find the limits for $\iiint_V \nabla \cdot \bar{F}\,dv$, Where v is the volume of the region bounded by $x = 0$, $y = 0$, $z = 0$ and $2x+2y+2z = 4$.	CO5	L1	2M
10.	State Green's theorem.	CO5	L1	3M

Section B (Essay Questions)

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

11. A)	i) Solve: $y(2xy + e^x)dx = e^x dy$	CO1	L2	5 M
	ii) A body kept in air with temperature at 25°c cools from 140°c to 80 °c in 20 minutes. Find when the body cools down to 35°c.	CO1	L3	5 M
	OR			
B)	i) Solve: $\frac{dy}{dx} + 2xy = e^{-x^2}$	CO1	L2	5 M
	ii) Find the orthogonal trajectories of $r = a(1 + cos\theta)$.	CO1	L2	5 M
12. A)	Find the solution of $y^{111} - y = e^x + \text{Sin}3x$	CO2	L2	10M
	OR			
B)	Find the solution of $\frac{d^2y}{dx^2} + 9y = \text{Cosec}3x$ by using method of variation of parameters.	CO2	L3	10M
13. A)	Change the order of integration and hence evaluate $\int_0^1 \int_{x^2}^{2-x} xy\,dy\,dx$.	CO3	L3	10M

OR

B)	Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \; dz\, dy\, dx$	CO3	L3	10M
14. A)	i) Find the directional derivative of f = xy + yz + zx in the direction of vector i + 2j +2k the point (1,2,0).	CO4	L2	5 M
	ii) For what value of λ, F =$(x+3y)$ i + $(y-2z)$ j+ (x+λz)k is Solenoidal?	CO4	L2	5 M
	OR			
B)	i) Find the angle between the normal to the surfaces x^2 = yz at the point (1, 1, 1) and (2, 4, 1)	CO4	L3	5 M
	ii) Prove that ∇ × (A × B) = A (∇ · B) −B (∇ · A) + (B · ∇) A − (A · ∇) B	CO4	L2	5 M
15. A)	Evaluate $\iint_S \bar{F} \cdot \bar{n}\, ds$, if $\bar{F} = (x+y^2)\hat{\imath} - 2x\hat{\jmath} + 2yz\hat{k}$, and s is the surface of the plane 2x + y + 2z = 6 in the first octant.	CO5	L3	10M
	OR			
B)	Verify Green's theorem in the XY −plane for $\int_c (xy+y^2)dx + x^2 dy$ where C is the closed curve of the region bounded by y = x, $y = x^2$.	CO5	L2	10M