Question Paper Code: R18A12HS01

R18

ANURAG Engineering College

(An Autonomous Institution)

I B.Tech II Semester Supplementary Examinations, Jan/Feb-2024

MATHEMATICS - II

(COMMON TO ALL BRANCHES)

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

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

Answer All Questions

	Question	Course Outcome	B.T Level	Marks
1.	Define Exact differential equation.	CO1	L1	2M
2.	Find the integrating factor of $(y+x)dx = (y-x)dy$.	CO1	L2	3M
3.	Solve $(D^2+5D+6)y = 0$	CO2	L2	2M
4.	Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = \sin 2x$	CO2	L2	3M
5.	Evaluate $\int_{y=0}^{2}\int_{x=0}^{3} xy\,dx\,dy$	CO3	L2	2M
6.	Evaluate $I = \int_0^1\int_1^2\int_2^3 xyz\,dx\,dy\,dz$	CO3	L2	3M
7.	Define solenoidal vector.	CO4	L1	2M
8.	If $\bar{F} = x\,i + xy\bar{j} + zx\,\bar{k}$, Evaluate curl$\bar{F}$	CO4	L2	3M
9.	State Stokes theorem.	CO5	L1	2M
10.	Apply Green's theorem to evaluate $\frac{1}{2}\oint(xdy - ydx)$ where R is the region bounded by $y = x$ and $y = x^2$.	CO5	L2	3M

Section B (Essay Questions)

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

	Question	Course Outcome	B.T Level	Marks
11. A)	Solve $(y^4+2y)dx + (xy^3 + 2y^4 - 4x)\,dy = 0$.	CO1	L3	10M
	OR			
B)	A body is originally at $100^\circ c$ and cools down to $75^\circ c$ in 10 minutes. If the temperature of the air is $20^\circ c$, find the temperature of the body after 30 minutes and when will be the temperature be $25^\circ c$.	CO1	L3	10M
12. A)	Solve the differential equation $(D^2-5D+6)y = e^x \sin x$	CO2	L3	10M
	OR			
B)	Solve $(D^2-4D+4)y = 8x^2e^{2x}\sin 2x$	CO2	L3	10M
13. A)	Evaluate $\iiint_v (xy+yz+zx)\,dx\,dy\,dz$ where V is the region of space bounded by $x=0, x=1, y=0, y=2, z=0, z=3$	CO3	L3	10M
	OR			
B)	Evaluate $\int_0^{\frac{\pi}{2}}\int_{a(1-\cos\theta)}^{a} r^2\,dr\,d\theta$	CO3	L3	10M

14. A)	Find the value of a and b so that the surface ax^2 – byz = (a +2) is orthogonal to the surface $4x^2y + z^3 = 4\ at\ (1,-1,2)$.	CO4	L3	10M
	OR			
B)	Find the directional derivative of $2x^2 + z^2$ at (1,-1,3) in the direction of $\bar{i} + 2\bar{j} + 3\bar{k}$	CO4	L3	10M
15. A)	Verify Gauss's divergence theorem for $\bar{F} = 2x^2y\bar{i} - y^2\bar{j} + 4xz^2\bar{k}$ taken over the region of the first octant of the cylinder $y^2 + z^2 = 9\ and x = 2$.	CO5	L2	10M
	OR			
B)	Verify Stokes's theorem for $\bar{F} = y\bar{i} \mp z\bar{j} + x\bar{k}$ and upper surface is the part of the plane $x^2 + y^2 + z^2 = 1$ above the xy-plane.	CO5	L3	10M