22-07-21 (N)

Hall Ticket No.: | | | | | | | | | | |

Question Paper Code: MA201BS

NARSIMHA REDDY ENGINEERING COLLEGE

(UGC-AUTONOMOUS)

B.TECH I YEAR I SEMESTER REGULAR EXAMINATIONS, SEPT-2021

(Regulation: NR20)

MATHEMATICS-II

(Common to CIVIL, EEE, ME, ECE, CSE, CSE (CS), CSE (AI&ML), CSE (DS))

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

Answer any Five Questions
All Questions carry Equal Marks

		Marks	Bloom's Level
1.	a. Solve $\sec^2 y\frac{dy}{dx} + 2x\tan y = x^3$	8	3
	b. Solve $(y - xy^2)\,dx - (x + x^2y)\,dy = 0$.	7	2
2.	a. Solve $(D^2 + a^2)y = \sec ax$ by the method of variation of parameters.	7	4
	b.Solve $\frac{d^2y}{dx^2} + 2y = x^2e^{3x} + e^x\cos 2x$.	8	4
3.	a. Evaluate $\int_0^{\frac{\pi}{2}}\int_{a\cos\theta}^{a} r^4 dr d\theta$.	7	3
	b. Evaluate $\int_0^1\int_{x^2}^{2-x} xy\,dy\,dx$ by change the order of integration.	8	4
4.	a. Find the directional derivative of $\varphi = 4xy^2 + 2x^2yz$ at $A(1,2,3)$ in the direction of AB, $B = (5,0,4)$.	7	2
	b.Prove that $div(gradr^n) = n(n+1)r^{n-2}$.	8	3

5.	Verify Greens theorem for $\int_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the region bounded by $y = \sqrt{x}$ and $y = x^2$.	15	4
6.	a. A body is originally at 80^0C and cools down to 60^0C in 20 minutes. If the temperature of the air is 40^0C, then find the temperature of the body after 40 minutes.	8	3
	b.Solve $\sin px \cos y = \cos px \sin y + p$	7	3
7.	Solve$(x^2D^2 - 3xD + 1)y = \log x \left[\frac{\sin(\log x)+1}{x}\right]$.	15	4
8.	Verify Stokes theorem for $\vec{F} = (x^2 - y^2)\vec{i} - 2xy\vec{j}$ over the box bounded by the planes $x = 0, x = a, y = 0, y = b$.	15	3

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Q.P Code: MA1201BS Hall Ticket No.:

NARSIMHA REDDY ENGINEERING COLLEGE
(UGC AUTONOMOUS)

I B.Tech II Semester (NR20) Supplementary Examination, February 2023

MATHEMATICS-II

(Common to CE, EEE, ME, ECE, CSE, CSE (CS), CSE (AI&ML) & CSE (DS))

Time : 3 hours **Maximum marks: 75**

Note:
- This question paper contains two parts, A and B
- Part A is compulsory which carries 25 marks (1st 5 sub questions are one from each unit carry 2 Marks each & Next 5 sub questions are one from each unit carry 3 Marks). Answer all questions in Part A
- Part B Consists of 5 Units. Answer one question from each unit. Each question carries 10 Marks and may have a, b sub questions

Part-A **(25 Marks)**

Answer all questions

Q.No		Question	M	CO	BL
1)	a.	Solve $xdx + ydy = \frac{xdy - ydx}{x^2+y^2}$	2	CO1	L3
	b.	Define the Newton's law of cooling	2	CO1	L1
	c.	Determine the solution of $(D^2 - 6D+13)\,y = 0$	2	CO2	L5
	d.	Find the PI of $(D^2+D+1)y = e^{-x}$	2	CO2	L3
	e.	Evaluate $\int_0^2\int_0^x ydydx$	2	CO3	L5
	f.	Evaluate $\int_{-1}^{1}\int_{-2}^{2}\int_{-3}^{3} dx\,dy\,dz$	3	CO3	L5
	g.	Define the Gradient of a scalar	3	CO4	L1
	h.	Define the Directional derivative of the vector	3	CO4	L1
	i.	What is irrotational vector	3	CO4	L1
	j.	State the Green's theorem	3	CO4	L2

Part-B **(50 Marks)**

Answer all the Units

All Questions carry equal Marks

Q.No		Question	M	CO	BL
		UNIT–I			
2)	a.	Solve $x\log x\frac{dy}{dx} + y = 2\log x$	5	CO1	L3
	b.	If the temperature of a body is changing from 100°C to 70°C in 15 minutes, find when the temperature will be 40°C, if the temperature of air is 30°C.	5	CO1	L3
		OR			
3)	a.	Solve $(x^3 - ay)dx = (ax - y^2)dy$	5	CO1	L3
	b.	A bacteria culture growing exponentially increases from 100 to 400gms in 10 hrs. How much was present after 3more hours.	5	CO1	L3
		UNIT–II			
4)		Solve $(D^2 - 2D+3)y = e^x+x^2+\cos 2x$	10	CO2	L3
		OR			
5)	a.	Solve $(D^2 - 5D+6)y = e^x\sin x$	5	CO2	L3
	b.	Solve $y'' + 4y = \tan 2x$ using variation of parameters	5	CO2	L3
		UNIT–III			
6)	a.	Evaluate $\int_0^1\int_x^{\sqrt{x}} (x^2 + y^2)dy\,dx$	5	CO3	L5
	b.	Change the order of integration and evaluate $\int_0^a\int_{x^2/a}^{\sqrt{x^3/a}} (x^2 + y^2)dx\,dy$	5	CO3	L5
		OR			
7)	a.	Evaluate $\iint_R y\,dx\,dy$ where R is the region bounded R by the parabolas $y^2 = 4ax$ and $x^2=4ay$	5	CO3	L5
	b:	Evaluate $\int_1^e\int_0^{\log y}\int_1^{e^x} \log z\,dz\,dx\,dy$	5	CO3	L5
		UNIT–IV			
8)	a.	Find the directional derivative of $\phi = xy + yz + zx$ at point (1,2,0) in the direction of the vector $\bar{i} + 2\bar{j} + 2\bar{k}$	5	CO4	L3
	b.	Show that the vector $f = grad(x^3 + y^3 + z^3 - 3xyz)$ is irrotational	5	CO4	L3
		OR			
9)	a.	Evaluate the angle between the normals to the surface $xy = z^2$ at (4,1,2) and (3,3,-3)	5	CO4	L5
	b.	Show that the vector $(x^2 - yz)\bar{i} + (y^2 - xz)\bar{j} + (z^2 - xy)\bar{k}$ is irrotational and find its scalar potential	5	CO4	L3
		UNIT–V			
10)		Evaluate the line integral $\int_C[(x^2 + xy)dx + (x^2 + y^2)dy]$ where C is the square formed by the lines $x = \pm 1$ and $y = \pm 1$	10	CO4	L5
		OR			
11)		Using Greens theorem evaluate $\int (2xy - x^2)dx + (x^2 + y^2)dy$ where C is the closed curve of the region bounded by $y = x^2$ and $y^2 = x$	10	CO4	L5

Q.P Code: MA1201BS Hall Ticket No.:

M2-NR21

NARSIMHA REDDY ENGINEERING COLLEGE
(UGC AUTONOMOUS)

I B.Tech II Semester (NR21) Supplementary Examination, February 2023

ADVANCED CALCULUS

(Common to CE, EEE, ME, ECE, CSE, CSE (CS), CSE (AI&ML) & CSE (DS))

Time : 3 hours **Maximum marks: 70**

Note:
- This question paper contains two parts, A and B
- Part A is compulsory which carries 20 marks (10 sub questions are two from each unit carry 2 Marks). Answer all questions in Part A
- Part B Consists of 5 Units. Answer one question from each unit. Each question carries 10 Marks and may have a, b sub questions

Part-A **(20 Marks)**

Answer all questions

Q.No		Question	M	CO	BL
1)	a.	Solve $xdx + ydy = a^2\left[\frac{xdy - ydx}{x^2+y^2}\right]$.	2	CO1	L2
	b.	Find the integrating factor of $x\frac{dy}{dx} + y = \log x$.	2	CO1	L1
	c.	Solve $\frac{d^4y}{dx^4} + 4y = 0$.	2	CO1	L2
	d.	Find the PI of $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = e^x$.	2	CO1	L1
	e.	Evaluate $\int_{y=0}^{2}\int_{x=0}^{3} xy\,dx\,dy$.	2	CO2	L3
	f.	Evaluate $\int_{0}^{2}\int_{0}^{x} ydydx$.	2	CO2	L3
	g.	Define the irrotational vector	2	CO3	L1
	h.	Find div F, where $F=x\vec{i}+y\vec{j}+z\vec{k}$	2	CO3	L1
	i.	Define work done by the force.	2	CO4	L1
	j.	State the Stokes theorem.	2	CO4	L1

Part-B **(50 Marks)**

Answer all the Units

All Questions carry equal Marks

Q.No		Question	M	CO	BL
		UNIT–I			
2)	a.	Solve $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$	5	CO1	L3
	b.	Solve $x\log x\frac{dy}{dx} + y = 2\log x$	5	CO1	L3
		OR			
3)	a.	Solve $(1-x^2)\frac{dy}{dx} + xy = y^3\sin^{-1}x$.	5	CO1	L3
	b.	The number N of bacteria in a culture grew at a rate proportional to N. The value of N was initially 100 and increased to 332 in one hour. What was the value of N after $1\frac{1}{2}$ hour.	5	CO1	L4
		UNIT–II			
4)	a.	Solve $(D^2+4D+3)y = e^{2x}$	5	CO1	L3
	b.	Solve $(D^2-4D+4)y = 8x^2e^{2x}\sin 2x$.	5	CO1	L3
		OR			
5)	a.	Solve $(D^2-2D+3)y = e^x + x^2 + \cos 2x$	5	CO1	L3
	b.	Apply the method of variation of parameters to solve $(D^2+1)y = \operatorname{cosec} x$	5	CO1	L3
		UNIT–III			
6)	a.	Evaluate $\int_{0}^{1}\int_{x}^{\sqrt{x}} x^2y^2(x+y)dydx$.	5	CO2	L5
	b.	Evaluate $\iint_R xy\,dx\,dy$ where R is the region bounded by x-axis, ordinate x = 2a and the curve $x^2 = 4ay$.	5	CO2	L5
		OR			
7)		Change the order of Integration in $\int_{0}^{1}\int_{x^2}^{2-x} xy\,dx\,dy$ and hence Evaluate the double integral.	10	CO2	L5
		UNIT–IV			
8)	a.	Find the directional derivative of $\emptyset = xy + yz + zx$ *at the point* (1,2,0) in the direction of the vector $\vec{i} + 2\vec{j} + 2\vec{k}$.	5	CO3	L3
	b.	Show that the vector $(x^2-yz)\vec{i} + (y^2-xz)\vec{j} + (z^2-xy)\vec{k}$ is irrotational and find its scalar potential.	5	CO3	L3
		OR			
9)	a.	Find the angle between the surfaces $x^2+y^2+z^2=9$ and $z = x^2+y^2-3$ at the point (2,-1,2)	5	CO3	L3
	b.	Prove that curl $(r^n\vec{r}) = \vec{0}$	5	CO3	L3
		UNIT–V			
10)	a.	Find the work done in moving particle in the force field $\vec{f} = 3x^2\vec{i} + (2xz-y)\vec{j} + z\vec{k}$ along the straight line from (0,0,0) to (2,1,3)	5	CO4	L3
	b.	Evaluate $\oint_C (x^2+2y)dx + (4x+y^2)dy$ by Green's theorem where C is the boundary of the region bonded by $y = 0,\ y = 2x$ *and* $x + y = 3$.	5	CO4	L5
		OR			
11)	a	Verify Gauss divergence theorem for $\vec{f} = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$, over the cube formed by the planes x=0,x=a,y=0,y=b,z=0,z=c	10	CO4	L6

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