R22

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

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Aziznagar Gate, ChilkurBalaji Road, Hyderabad - 500 075. **Subject Code: A222005**

I B Tech II SEMESTER SUPPLEMENTARY EXAMINATION, JAN/FEB - 2025

Subject: Mathematics II | **Branch: Common To All**

Time: 3 hours | **Max. Marks: 60**

Note: This Question Paper contains two Parts A and B. Answer all the questions.

- Part A is compulsory which carries 10 marks. Ten questions from five units.
- Part-B consists of 5 Questions (numbered from 11 to 15) carrying 10 marks each.

Bloom's Level:

Remember	L1	Apply	L3	Evaluate	L5
Understand	L2	Analyze	L4	Create	L6

	PART-A	CO	PO	B L	Marks
	ANSWER ALL THE QUESTIONS **10Q x 1M=10 Marks**				
1	Define Exact differential equation.	1	1	L1	1M
2	State Newton's law of cooling.	1	1	L2	1M
3	Find the complementary function for $\frac{d^3x}{dt^3} - x = 0$	2	1	L1	1M
4	Find the Wronskian of two functions e^{-2x}, e^{2x}	2	1	L3	1M
5	State the First shifting theorem of Laplace Transform	3	1	L1	1M
6	Find $L^{-1}\{\frac{1}{(s-2)^2}\}$	3	2	L3	1M
7	Define Solenoidal Vector.	4	1	L1	1M
8	Compute the divergence of $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$.	4	2	L2	1M
9	State Stoke's theorem.	5	1	L1	1M
10	Prove that the scalar field $\bar{F} = (x^2 + xy^2)i + (y^2 + x^2y)j$ is conservative.	5	2	L3	1M

	PART-B				
	ANSWER ALL THE QUESTIONS **5Q x 10M = 50Marks**				
11 i)	Solve the following differential equations A) $\left(1-x^2\right)\frac{dy}{dx} + xy = y^3 \sin^{-1} x$ B) $\frac{dy}{dx} + x\sin 2y = x^3 \cos^2 y$	1	1	L3	10M
	[OR]				
ii)	If 30% of a radioactive substance disappears in 10 days, how long will it take for 90% of it to disappear?	1	2	L4	10M
12 i)	Using the method of variation of parameters, solve $\frac{d^2y}{dx^2} + 4y = \cos ec 2x$	2	1	L2	10M
	[OR]				
ii)	Solve the linear differential equation $(D^2 - 6D + 25)y = e^{2x} + \sin x + x$	2	1	L3	10M
13 i) a	Find the Laplace transform of $L\{e^t sint\}$	3	2	L4	5M
b	Solve the equation $\left(D^2 - 3D + 2\right)y = 1 - e^{-2t}$, $y(0) = 1, y'(0) = 0$, using Laplace transform technique.	3	2	L4	5M
	[OR]				
ii)	Solve the differential equation by using Laplace transform $\frac{d^2x}{dt^2} - 4\frac{dx}{dt} - 12x = e^{3t}$ given that $x(0) = 1$ and $x'(0) = -2$	3	2	L3	10M
14 i) a	Change the order of integration and hence evaluate $\int_0^{4a}\int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dydx$	4	1	L3	5M
b	Show that $div(grad\, r^n) = \nabla^2(r^n) = n(n+1)r^{n-2}$	4	1	L3	5M
	[OR]				
ii)	Find the Directional derivative of $\emptyset = x^2yz + 4xz^2$ at (1,-2,-1) in the direction of the normal to the surface $f(x,y,z) = x\log z - y^2$ at (-1, 2, 1).	4	1	L2	10M
15 i)	Verify Green's theorem for $\int_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the boundary of the region bounded by x=0,y=0 and x+y=1.	5	1	L4	10M
	[OR]				
ii)	Apply Stoke's theorem to evaluate $\int_c (x+y)dx + (2x-z)dy + (y+z)dz$ where C is the boundary of the triangle with vertices (0,0,0),(1,0,0) and (1,1,0).	5	1	L3	10M

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Aziznagar Gate, ChilkurBalaji Road, Hyderabad - 500 075. **Subject Code: A222005**

I B Tech II SEMESTER REGULAR & SUPPLEMENTARY EXAMINATION, JULY-2024

Subject: Mathematics - II **Branch: Common to All**

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

Note: This Question Paper contains two Parts A and B. Answer all the questions.

- Part A is compulsory which carries 10 marks. Ten questions from five units.
- Part-B consists of 5 Questions (numbered from 11 to 15) carrying 10 marks each.

Bloom's Level:

Remember	L1	Apply	L3	Evaluate	L5
Understand	L2	Analyze	L4	Create	L6

		Outcomes			
	PART-A 10Q x 1M=10 Marks				
ANSWER ALL THE QUESTIONS		**CO**	**PO**	**B L**	**Marks**
1	Find the integrating factor of, $y(1+xy)dx + x(1-xy)dy = 0$.	1	1,2	L1	1M
2	Find the differential equation of orthogonal trajectories of circles $r = a\cos\theta$	1	1,2	L1	1M
3	Solve, $(D^2 - 4)\,y = 0$.	2	1,2	L3	1M
4	Evaluate, $\frac{1}{(D-5)^3}e^{5x}$	2	1,2	L5	1M
5	Find the Laplace Transforms of $e^{-t}\,sint$	3	1,2	L1	1M
6	Find $L^{-1}\left\{\frac{1}{s(s+1)}\right\}$	3	1,2	L1	1M
7	Evaluate $\int_0^2\int_0^x y\,dy\,dx$	4	1,2	L5	1M
8	Find the Greatest value of the Directional Derivative of $\phi(x,y,z) = 2x^2 - y - z^4$ at $(2,1,-1)$	4	1,2	L1	1M
9	Applying Gauss Divergence Theorem Prove that $\int_S \bar{r}.\bar{n}ds = 3V$.	5	1,2	L3	1M
10	State Stoke's theorem.	5	1,2	L1	1M
	PART-B 5Q x 10M = 50 Marks				
ANSWER ALL THE QUESTIONS					
11 i)	Solve, $2y\,cosy^2\frac{dy}{dx} - \frac{2}{x+1}\,siny^2 = (x+1)^3$	1	1,2	L3	10M
	[OR]				
ii)	The temperature of the body drops from 100 ^{o}c to 75 ^{o}c in ten minutes when the surrounding air is at 20 ^{o}c temperature. What will be its temperature after half an hour? When will the temperature be 25 ^{o}c?	1	1,2	L1	10M
12 i)	Solve, $(D-2)^2 y = 8\,(e^{2x} + \sin 2x + x^2)$.	2	1,2	L3	10M
	[OR]				
ii)	Solve, $\frac{d^2y}{dx^2} + a^2y = \text{cosec}\,ax$ by the method of variation of parameters.	2	1,2	L3	10M
13 i)	Apply convolution theorem to evaluate $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$	3	1,2	L3	10M
	[OR]				
ii)	Solve the differential equation $\frac{d^2x}{dt^2} - 4\frac{dx}{dt} - 12x = e^{3t}$ Given that $x(0) = 1$ and $x'(0) = -2$ by using Laplace transforms.	3	1,2	L3	10M
14 i)	Evaluate $\iiint_V (x^2+y^2+z^2)\,dx\,dy\,dz$ taken over the volume enclosed by the sphere $x^2+y^2+z^2 = 1$, by transforming into spherical polar coordinates.	4	1,2	L5	10M
	[OR]				
ii)	Find the angle between the surfaces $x^2+y^2+z^2 = 9, z = x^2+y^2-3$ at the point $(2,-1,2)$	4	1,2	L1	10M
15 i)	Verify Green's theorem for $\int_C[(xy+y^2)dx + x^2dy]$ where C is bounded by $y = x$ and $y = x^2$	5	1,2	L4	10M
	[OR]				
ii)	Verify Gauss Divergence Theorem For $\bar{F} = (x^2 - yz)\,\bar{i} + (y^2 - zx)\,\bar{j} + (z^2 - xy)\,\bar{k}$ taken over the Rectangular parallelepiped $0 \le x \le a, 0 \le y \le b, 0 \le z \le c$	5	1,2	L4	10M

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

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R21

Accredited by NAAC & NBA, Approved by AICTE New Delhi & Permanently Affiliated to JNTUH]
Aziznagar Gate, Chilkur Balaji Road, Hyderabad - 500 075. **Subject Code: A52007**

B. Tech. I Year II Semester Regular Examination, September-2022

Subject: Mathematics-II **Branch: Common to ALL**

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

Note: This question paper contains two *Parts A and B. Part A* is compulsory which carries 25 Marks. Answer all question in Part A. *Part B* consists of 5 Units. Answer all the questions.

Bloom's Level:

Remember	L1	Apply	L3	Evaluate	L5
Understand	L2	Analyze	L4	Create	L6

	PART-A 25 Marks	Outcomes CO	PO	Bloom's Level	Marks
	ANSWER ALL THE QUESTIONS				
1	Form the differential equation by eliminating the arbitrary constant $y^2 = (x-c)^2$	1	1-12	4	2M
2	Solve $(x^2 - y^2)dx = 2xydy$	1	1-12	1	3M
3	Solve $(D^4 - 1)y = 0$	2	1-12	5	2M
4	Find Particular Integral of $(D^2 + 4D + 3)y = e^{2x}$	2	1-12	4	3M
5	Define unit step function and find the Laplace transform of unit step function.	3	1-12	3	3M
6	Find $L\{e^{4t} \sin 2t\}$	3	1-12	4	2M
7	Evaluate $\int_0^1 \int_0^2 \int_1^2 x^2yz\, dx\, dy\, dz$	4	1-12	6	2M
8	If $\varphi = 2xz^4 - x^2y$, find $\|\nabla\varphi\|$ at the point $(2,-2,-1)$	4	1-12	4	3M
9	Define Stoke's Theorem	5	1-12	1	2M
10	Prove that the vector field $\vec{F} = (x^2 + xy^2)\hat{i} + (y^2 + x^2y)\hat{j}$ is conservative	5	1-12	3	3M

	PART-B 5Q x 10M = 50Marks	CO	PO	Bloom's Level	Marks
	ANSWER ALL THE QUESTIONS				
11.i.a)	Solve $(x+y+1)\frac{dy}{dx} = 1$	1	1-12	4	5M
b)	Solve $x\frac{dy}{dx} + y = x^2y^6$	1	1-12	5	5M
	[OR]				
ii	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, find the temperature of the body after 40 minutes.	1	1-12	6	10M
12. i	Solve by the method of variation of parameters $(D^2 + 4)y = \tan 2x$	2	1-12	4	10M
	[OR]				
ii	Solve $(D^2 - 4)y = x \sinh x$	2	1-12	5	10M
13. i	Find $L^{-1}\left\{\frac{1}{s^4+a^4}\right\}$	3	1-12	4	10M
	[OR]				
ii.	Using Laplace transform, Solve $(D^2 + 4D + 5)y = 5$ and given that $y(0) = 0, y'(0) = 0$	3	1-12	2	10M
14.i. a)	Find the directional derivative of $\phi(x,y,z) = xy^2 + yz^3$ at $(2,-1,1)$ in the direction of the vector $\hat{i} + 2\hat{j} + 2\hat{k}$	4	1-12	5	7M
b)	Find a unit normal vector to the surface $x^3 + y^3 + 3xyz = 3$ at the point $(1,2,-1)$	4	1-12	5	3M
	[OR]				
ii. a)	Evaluate $\iint_R y\,dxdy$, where R is the region bounded by $y^2 = 4x$ and $x^2 = 4y$	4	1-12	4	5M
b)	Prove that Curl grad $\varphi = 0$	4	1-12	6	5M
15 i	Verify Green's theorem in the plane for $\oint_C (x^2 - xy^3)dx + (y^2 - 2xy)dy$, where C is the square with vertices $(0,0),(2,0),(2,2)$ and $(0,2)$.	5	1-12	4	10M
	[OR]				
ii	If $\varphi = 45x^2y$ evaluate $\iiint \varphi\, dv$ where V is the closed region bounded by the planes $4x + 2y + z = 8, y = 0, z = 0$	5	1-12	3	10M

Vidya Jyothi Institute of Technology (Autonomous)

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(Aziz Nagar, C.B.Post, Hyderabad -500075) **Subject Code:A22006/A32007/A42007**

R18/ R19/ R20

B. Tech. I Year II Semester Supplementary Examination, April-2022

Subject: Mathematics -II **Branch: Common to all**

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

Bloom's Level:

Remember	L1	Apply	L3	Evaluate	L5
Understand	L2	Analyze	L4	Create	L6

	PART-A 25 Marks	Outcomes CO	Outcomes PO	Bloom's Level	Marks
	ANSWER ALL THE QUESTIONS	CO	PO		
1	Solve the differential equation $(x+y)dx+(x-y)dy=0$.	1	1	L3	2M
2	Determine the solution of the differential equation $(x+1)\frac{dy}{dx}-y=e^{3x}(1+x)^2$.	1	1	L5	3M
3	Find solution of the differential equation $(D^2-1)y=0$.	2	1	L3	2M
4	Find particular integral of the differential equation $(D^2+5D+6)y=e^x$.	2	1	L1	3M
5	Find Laplace transform of the function $e^{2t}cost$.	3	2	L1	2M
6	Find $L^{-1}(\frac{1}{s^2+2s+2})$.	3	2	L1	3M
7	Determine normal to the surface $x^2+y^2+xyz=3$ at the point $(1,1,1)$.	4	2	L4	2M
8	Find curl that the vector field $\vec{F}=(x+3y)i+(y-3z)j+(x-2z)k$.	4	2	L1	3M
9	State Stoke's theorem.	5	1	L1	2M
10	Evluate line inetegral $\int_c \vec{F}.\overrightarrow{dr}$ $where$ $\vec{F}=yi+xj$ and c is straight line from $(0,0)$ to $(1,1)$.	5	1	L5	3M
	PART-B 5Q x 10M = 50M				
	ANSWER ALL THE QUESTIONS				
11 i) a.	Show that the family of curves $y^2=4a(x+a)$ where is a is parameter, are self orthogonal.	1	1	L2	5M
b.	Solve the differential equation $x\frac{dy}{dx}+y=x^3y^6$.	1	1	L3	5M
	[OR]				
ii)	A body originally at $80°C$ cools down to $60°C$ in 20 minutes, the temperature of the air being $40°C$. What will be the temperature of body after 40 minutes from the original	1	2	L3	10M
12 i) a.	Solve the differential equation $(D^3+4D)y=sin2x$	2	1	L3	5M
b.	Determine the solution of the differential equation $(D^2-2D+1)y=xe^x sinx$.	2	1	L4	5M
	[OR]				
ii)	By the method of variation of parameters solve the differential equation $(D^2+a^2)y=tanax$.	2	1	L4	10M
13.i) a.	Find $L\left(\int_0^t e^{2x}xsinx\ dx\right)$.	.3	2	L1	5M
b.	By using convolution find $L^{-1}\left(\frac{s}{(s^2+1)(s^2+4)}\right)$.	3	1	L3	5M
	[OR]				
ii)	Solve the differential equation $y''+y=t, y(0)=1$, $y'(0)=0$ with the help of Laplce transforms.	3	1	L3	10M

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		Outcomes		Bloom's Level	Marks
		CO	PO		
14 i)	Find the directional derivative of the function $f = xy^3 + yz^3$ at the point (2,-1,1) in the direction of the vector $\vec{a} = 4i - 2j + k$.	4	1	L3	10M
	[OR]				
ii) a.	Determine constants a, b such thevector field $\vec{A} = (2xy + 3yz)i + (x^2 + axz - 4z^2)j - (3xy + byz)k$ is solenoidal.	4	2	L5	5M
b.	Show that $\nabla^2 f(r) = f''(r) + \frac{2}{r} f'(r)$ where $\vec{r} = xi + yj + zk$ and $r = \sqrt{x^2 + y^2 + z^2}$.	4	1	L3	5M
15 i)	Find the total work done by the force $\vec{F} = 3x^2 i + (2zx - y)j + zk$ along the straight line from $(0,0,0)$ to $(2,1,3)$	5	1	L3	10M
	[OR]				
ii)	Verify Green's theorem for $\int_C (xy + x^2)dx + x^2 dy$ where C is bounded by $y = x$ and $y = x^2$	5	2	L3, L4	10M

VJIT(A)