Vidya Jyothi Institute of Technology (Autonomous)

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(Aziz Nagar, C.B.Post, Hyderabad -500075)   **Subject code: A21006**

I B. Tech II SEM REGULAR EXAMINATION – MAY 2019
MATHEMATICS-II
(COMMON TO CE, EEE, MECH, ECE, CSE AND IT)

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

Note: This question paper contains two PARTs A and B.

PART A is compulsory which carries 25 marks. Answer all questions.

PART B consists of 5 questions. Answer all the questions.

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

PART-A		Bloom Levels	Marks 25
ANSWER ALL THE QUESTIONS			
1	Define orthogonal trajectories.	L1	2M
2	Solve $x\,dy - y\,dx = a(x^2 + y^2)dy$	L1	3M
3	Find particular Integral of $\frac{1}{D^2-2D+1}(e^x \cos x)$	L3	2M
4	Solve $(D^4 + 1)y = 0$	L3	3M
5	Find the Laplace transform of $\sin hat$	L1	2M
6	State the Convolution theorem of Laplace transform.	L3	3M
7	Evaluate double integral $\int_0^3 \int_0^1 (x^2 + 3y^2)dydx$	L5	2M
8	Find $grad\left(\frac{1}{r}\right)$	L1	3M
9	State the Green's theorem.	L3	2M
10	Prove that the scalar field $\overline{F} = \left(x^2 + xy^2\right)i + \left(y^2 + x^2y\right)j$ is conservative	L5	3M
PART-B		**Bloom Levels**	**Marks 50**
ANSWER ALL THE QUESTIONS			
11. i.a)	Solve $(3xy^2 - y^3)dx - (2x^2y - xy^2)dy = 0$	L3	5M
b)	Solve $\frac{dy}{dx} = y + xy^5$	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 the body after 40 minutes from the original.	L1	10M
12. i. a)	Solve $(D^2 + 2D + 1)y = e^{2x} - \cos^2 x$	L3	5M
b)	Solve $(D^2 + 4D + 3)y = e^{-x}\sin x + x\,e^{-3x}$	L3	5M
	[OR]		
ii)	Solve $(D^2 + 1)y = \tan x$ by method of variation of parameters.	L3	10M
13. i. a)	Find the $L^{-1}\left(\frac{s^2}{(s^2+4)(s^2+1)}\right)$ by using convolution theorem.	L5	6M
b)	Find Laplace transform of $\left(e^{-t}\int_0^t \frac{\sin t}{t}dt\right)$	L3	4M
	[OR]		
ii)	Solve $y'' - 6y' + 9y = t^2 e^{3t}$, $y(0) = 2, y'(0) = 6$. by using Laplace Transform	L1	10M
14. i. a)	Change of order of integration $\int_0^a \int_{\frac{x^2}{a}}^{2a-x} xy^2\,dy\,dx$. and hence evaluate the same.	L5	5M
b)	Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz\,dz\,dy\,dx$	L5	5M

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[OR]

ii. a)	Find the directional Derivative of $\varphi = 5x^2y - 5y^2z + 2.5z^2x$ at point P(1,1,1) in the direction of $2i-j-k$		L2	5M
b)	Show that $\vec{F} = (x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$ is irrotational and find its scalar potential.		L1	5M
15. i.a)	Find the work done by force $\vec{f} = (2y + 3)i + xzj + (yz - x)k$ when it moves a particle from the point (0,0,0) to (2,1,1) along the curve $x=2t^2$, $y=t, z=t^3$		L1	5M
b)	Evaluate $\int_c (x^2 + xy)\, dx + (x^2 + y^2)\, dy$ where C is the square formed by the lines $y=\pm1$ and $x=\pm1$.		L5	5M

[OR]

ii.	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 $x+y=1$		L5	10M

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