PES UNIVERSITY

PES University, Bengaluru

(Established under Karnataka Act No. 16 of 2013)

JULY 2021: IN SEMESTER ASSESSMENT B.TECH. II SEMESTER

TEST – 2

UE20MA151 - ENGINEERING MATHEMATICS – II (CHEMISTRY CYCLE)

Time: 2 Hrs | Answer All Questions | Max Marks: 70

1.	a)	Evaluate $\iiint_V (x^2+y^2)\,dxdydz$ taken over the region V bounded by the paraboloid $z = 9 - x^2 - y^2$ and the plane z=0	5
	b)	A lamina is bounded by the curves y= $x^2 - 3x$ and $y = 2x$. If the density at any point is given by λxy. Find by double integration, mass of the lamina.	5
2.	a)	Prove that the vector $\vec{F} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$ is irrotational and find the scalar potential given $\vec{F} = \nabla\emptyset$.	5
	b)	Evaluate $\oint(2y^3\, i + x^3 j + zk).$ (dxi + dy j+ dz k) over the surface of the cone $z = \sqrt{x^2+y^2}$ below $z = 4$.	5
3.	a)	Find the Laplace transform of $(1 + 2t^2 - 3t^3)u(t-1)$.	5
	b)	Evaluate $\int_0^\infty t^2\, e^{2t} \,cost\; dt$.	5
4.	a)	Find $L^{-1}\left\{\frac{8-6s}{(16s^2-9)} + \frac{4s}{(9s^2+16)} + \frac{3s-2}{(s-4)^2}\right\}$.	5
	b)	Find $\mathcal{L}^{-1}\left\{\frac{s^2}{(s^2+4)^2}\right\}$	5
5.	a)	Find $L^{-1}\left\{\frac{e^{-\left(\frac{1}{s}\right)}}{s}\right\}$	5
	b)	Solve $\frac{d^2x}{dt^2} - 2\frac{dx}{dt} + x = 4e^t$, given that $x(0) = 4$ and $x'(0)$ =7.	5
.	a)	Find the Fourier series expansion of $f(x) = x(1-x)(2-x)$ in (0,2).	5
	b)	Find the half-range sine series for the function $f(x) = \begin{cases} x & in\ (0, \pi/2) \\ \pi - x & in\ (\pi/2, \pi) \end{cases}$	5
	a)	Find the complex form of the Fourier series for the function $f(x) = cosax$, in $-\pi \le x \le \pi$, where 'a' is not an integer.	5
	b)	Find the Fourier series up to first harmonic for f (x) given by the following table:	5

x	0	60	120	180	240	300	360
y	7.9	7.2	3.6	0.5	0.9	6.8	7.9