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Code No. : 15157 (F) N

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. V-Semester Main Examinations, Jan./Feb.-2024**Integral Transforms (OE-III)**

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B****Part-A (10 × 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO
1.	Write the sufficient conditions for Existence of Laplace Transform.	2	1	1	1,2,12
2.	Find $L\{t \cdot \sin at\}$.	2	1	1	1,2,12
3.	State Convolution theorem of Laplace Transforms.	2	1	2	1,2,12
4.	Show that $L^{-1}\left\{\log\left(\frac{1+s}{s}\right)\right\} = \frac{1-e^{-t}}{t}$.	2	2	2	1,2,12
5.	Using Laplace Transformations, solve $y'' + ay = 0$; $y(0) = 1$.	2	1	3	1,2,12
6.	Find the Laplace transform of Triangular wave function.	2	1	3	1,2,12
7.	State final value theorem of Z-transforms.	2	1	4	1,2,12
8.	Make use of the initial value theorem to find u_0 from $Z[u_n] = z\left(e^{\frac{1}{z}} - 1\right)$.	2	2	4	1,2,12
9.	Illustrate about the difference equation with an example.	2	1	5	1,2,12
10.	State Convolution theorem of Z-Transforms.	2	1	5	1,2,12
Part-B (5 × 8 = 40 Marks)					
11. a)	Find $L\left\{e^t\left(\cos 2t + \frac{1}{2}\sinh 2t\right)\right\}$	4	2	1	1,2,12
b)	Find $L\left\{\int_0^t te^{-t} \sin 4t \cdot dt\right\}$	4	3	1	1,2,12
12. a)	Find $L^{-1}\left\{\log\left(\frac{s(s+1)}{s^2+4}\right)\right\}$	4	3	2	1,2,12
b)	Find $L^{-1}\left\{\frac{2s+12}{s^2+6s+13}\right\}$	4	2	2	1,2,12

13. a)	Find the solution of the Initial Value Problem $\frac{d^2x}{dt^2} + 3\frac{dx}{dt} + 2x = e^{-t}$ with $x(0) = 0, x'(0) = 1$ by using Laplace transformations.	4	3	3	1,2,12
b)	Draw Saw-tooth wave $f(t) = \frac{k}{p}t, 0 < t < p$ and find its Laplace Transform.	4	4	3	1,2,12
14. a)	Find $Z[2.5^n + 3n]$ and hence obtain $Z[2.5^{n+4} + 3(n+4)]$ using shifting theorem.	4	2	4	1,2,12
b)	Find Z - transform of $3n^2 + 10 \cos \frac{n\pi}{2} + a^{n+2}$ using linearity property.	4	2	4	1,2,12
15. a)	Find the inverse Z - transform of $\frac{z}{(z+3)^2(z-2)}$.	4	2	5	1,2,12
b)	Using the convolution theorem, find $Z^{-1} \left[\frac{z^2}{(z-4)(z-5)} \right]$.	4	2	5	1,2,12
16. a)	Find $L \left\{ \frac{\cos 4t \cdot \sin 2t}{t} \right\}$.	4	3	1	1,2,12
b)	Find $L^{-1} \left\{ \frac{1}{s(s^2-1)(s^2+1)} \right\}$	4	3	2	1,2,12
17.	Answer any two of the following:				
a)	Find $L\{f(t)\}$, if $f(t) = \begin{cases} t, & 0 < t < \pi \\ 0, & \pi < t < 2\pi \end{cases}$ with period 2π	4	3	3	1,2,12
b)	Using damping rule find $Z[5^n(1 - (-2)^n)]$.	4	2	4	1,2,12
c)	Find the inverse Z - transform of $\frac{4z^2-2z}{z^3-5z^2+8z-4}$.	4	3	5	1,2,12

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	40%
iii)	Blooms Taxonomy Level - 3 & 4	40%
