

Hall Ticket Number:

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Code No. : 14445

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.C.E.) IV-Semester Main & Backlog Examinations, July-2022

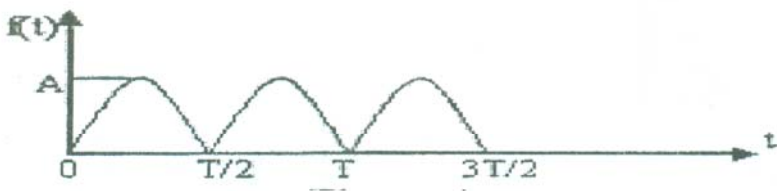
Signal Analysis and Transform Techniques

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.	Define even and odd components of the signal.	2	1	1	1
2.	Derive the relation between trigonometric and exponential Fourier series.	2	2	2	1
3.	Find Fourier transform of unit impulse signal.	2	2	2	2
4.	What is the condition for distortion less transmission?	2	1	3	2
5.	Explain the Region of Convergence of Laplace Transform with one example.	2	1	2	2
6.	Define Nyquist rate.	2	1	4	1
7.	Explain LSI system with one example.	2	1	1	1
8.	Distinguish causal and non-causal discrete systems.	2	1	1	2
9.	Explain poles and zeros in Z plane.	2	1	5	2
10.	State and prove time scaling property of Z transform.	2	1	5	2
Part-B (5 × 8 = 40 Marks)					
11. a)	Write a short note on following signals (i) Periodic and aperiodic signals (ii) Energy and power signals	4	2	1	2
b)	Find the exponential Fourier series for the Full-wave rectified sine wave as given below and draw the frequency spectrum.	4	3	2	3
					
12. a)	State and prove following properties of Fourier transform: i) Time shifting ii) Differentiation in time domain	4	2	2	2
b)	Consider a stable LTI system characterized by the differential equation $\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$, find impulse response.	4	4	3	3

13. a)	Find the inverse Laplace transform of $x(t) = \frac{5s+4}{s^2+2s+1}$ $\text{Re}(s) < -1$.	4	3	2	2
b)	What is aliasing? Explain its effect on sampling.	4	2	4	2
14. a)	Determine the linear convolution of the signals $x[n] = \{2, -1, 3, 2\}$ and $h[n] = \{1, -1, 1, 1\}$.	5	3	3	2
b)	Write a short notes on DTFT.	3	2	5	2
15. a)	Find the Z-transform and ROC of $x(n) = \left(\frac{1}{3}\right)^n [u(-n) - u(n-8)]$.	4	3	5	2
b)	Find the inverse Z transform of $X(z) = \frac{z}{(z-1)(z-2)}$.	4	3	5	2
16. a)	Define and sketch the unit step function and signum function bring the relation.	4	2	1	2
b)	Find the Fourier Transform of $x(t) = e^{-at}u(t)$?	4	3	2	3
17.	Answer any <i>two</i> of the following:				
a)	Find the Laplace transform and ROC of $x(t) = e^{-2t}u(t) + e^{-3t}u(t)$	4	3	2	2
b)	Derive the necessary and sufficient condition on impulse response for stability?	4	3	3	3
c)	Derive the relation between Fourier transform and Z transform.	4	2	5	2

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

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	33.75%
iii)	Blooms Taxonomy Level - 3 & 4	46.25%
