R18 Regulation *Subject code:2P6BD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VI Semester Supplementary Examinations, May 2025

SIGNALS AND SYSTEMS

(EEE)

Maximum Marks: 70 Date: 23.06.2025 Duration: 3 hours

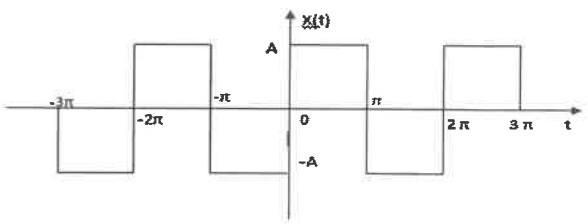
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	Prove the power of energy signal is zero over infinite time.	2M	1	L1
2	Write a short notes on exponential fourier series.	2M	1	L1
3	Define Fourier transform.	2M	2	L1
4	What is sampling .State sampling theorm.	2M	2	L1
5	Does the impulse response of a nonlinear system characterize the system?	2M	3	L1
6	State the conditions for stability and causality.	2M	3	L1
7	Find the convolution of two sequences x(n)={1,1,1,1} and h(n)={2,2}?	2M	4	L1
8	Explain about spectral density.	2M	4	L1
9	Estimate final value of laplace transform $X(s)=2/(s^2+4s-2)$	2M	5	L1
10	Determine Z transform of x(n)={1 ,2, 3,-1, 3,-2}	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) Develop the error function while approximating signals and hence derive the expression for condition for orthogonality between two waveforms $f_1(t)$ and $f_2(t)$. b) Show that x(t)=2,y(t)=1-2t are orthogonal over the interval [0,1].	5M 5M	1	L2
	OR			
12	Estimate the Trigonometric Fourier series for the Square wave shown below.	10M	1	L2



13	a) Apply the fourier transform of triangular function of duration $(-\tau/2,\tau/2)$ and sketch the spectrum. b) State and prove time reversal and time scaling properties of Fourier transform.	5M 5M	2	L2
	OR			
14	a) State and explain the sampling theorem for band pass signals. b) When does aliasing occur how can it be avoided.	5M 5M	2	L2
15	a)A system is excited by $x(t)=e^{-3t}u(t)$, the impulse response is $h(t)=e^{-2t}u(t)+e^{-2t}u(t)$ .Measure the output for the system. b)Derive the state transition matrix.	5M 5M	3	L2
	OR			
16	a) For a particular input x(t), the system is observed to produce the output, $y(t)=e^{-3t}u(t)-e^{-4t}u(t)$, evaluate the input x(t)? b) Write short notes on filter characteristics.	5M 5M	3	L2
17	a) Apply the convolution of x1(t) and x2(t) , x1(t)= t u(t), x2=u(t) 14. b) Prove the convolution theorems in time domain and frequency domain.	5M 5M	4	L2
	OR			
18	a) Explain the detection of periodic signals in the presence of noise by autocorrelation. b) Compare ESD and PSD.	5M 5M	4	L2
19	a) What is ROC? Propose ROCs of various classes of signlas. b) Determine the inverse laplace transform with all possible ROC's for $X(s)=\frac{1}{s(s+1)(s+2)(s+3)}$	5M 5M	5	L2
	OR			
20	Using the power series expansion technique, Interpret the inverse z-transform of the following. $X(z)=\frac{z}{2z^2-3z+1}$ i) $\|z\|<1/2$ ii) $\|z\|>1$	10M	5	L2