NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA

3rd SEMESTER B.Tech. DEGREE

ASSIGNMENT-2

03 NOVEMBER, 2025
Electrical and Electronics Engineering Department
SIGNALS & SYSTEMS – EE256
Last Date: 12/11/2025 24:00 Hours Weightage : 5 % Maximum Marks: 20
NOTE: Answer with clarity (Use derivations as well as MATLAB codes appropriately)
Name of the Instructors: Dr. H Girisha Navada & Dr. H. Nagendrappa

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1. Consider the LTI system described by (D+2)y(t) = x(t). If the input to the system x(t) is periodic square waveform shown in Fig.1, find the amplitude of the first and the third harmonics in the output. (Use Fourier Transform, and Fourier Series as applicable)

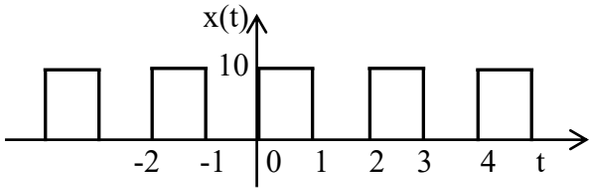

Fig.1

2. **Sketch the discrete-time signal** clearly, in the time domain, given the Fourier coefficients of the signal as shown in the following table, by direct computation (from fundamental equation). Also **write an array of values of the signal** in the time domain for one full period. **Express the signal in the time domain as Fourier series expansion** either in the compact trigonometric form or in the exponential form.

D_r :	1	-j0.9430	-j0.3210	-j0.380	+j0.1440	+j0.3950	-j0.150
		+j0.150	-j0.3950	-j0.1440	+j0.380	+j0.3210	+ j0.9430

3. Find the Fourier transform X(Ω) in the closed form for the signal shown in Fig. 2, and sketch the magnitude Fourier spectra |X(Ω)| over the range [-π to π]. Indicate the magnitude values at Ω = 0, ±π /2, ±π .

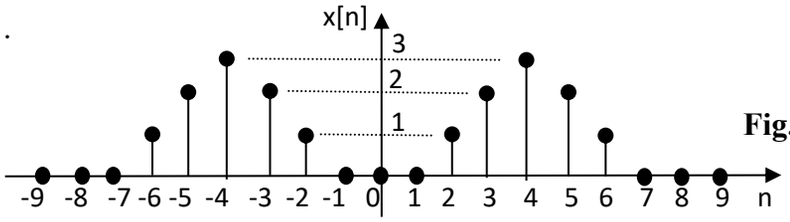

Fig. 2

4. Find the inverse Fourier Transform for the spectral response shown in Fig.3 of the discrete-time signals and sketch those discrete-time signal x(n) vs. "n". The spectral response is shown only for one period from -π to π, as it is periodic function in Ω.

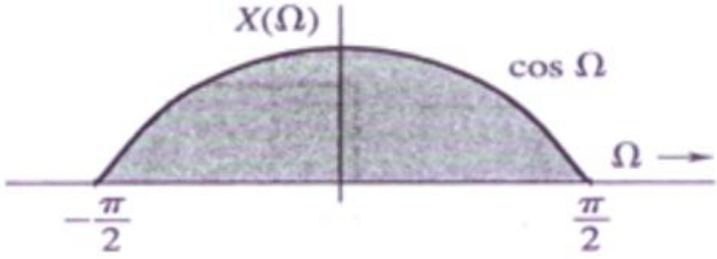

Fig. 3