SANT GADGE BABA AMRVATI UNIVERSITY, AMRAVATI
Summer Examination 2020
HVPM's College of Engineering and Technology, Amravati
Department of Electronics & Tele communication Engineering
Bachelor of Engineering Sem. :- IV

Subject:- Signals and Systems **Code :-4 ET 01**

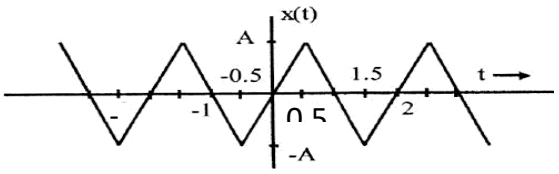
Instructions:-

1) **Solve any two questions**
2) **All question carry equal marks**

Q1.

a) Explain energy and power signal with the help of suitable example **02 credit Point**

b) Find the compact trigonometric Fourier Series for the triangular periodic signal x(t) shown in figure, sketch the amplitude and phase spectra for x(t).



02 credit Point

c) Derive the expression of signal energy (E,) in terms of signal spectrum (X(w))

02 Credit Point

d) Determine Laplace transform of the following

i) $\boldsymbol{\delta(t)}$ **ii)** $u(t)$ **iii)** $\cos w_0\, u(t)$t) **02 Credit Point**

e) Draw the signal graphically if

$\boldsymbol{x(n) = \{1, -1, 1, 1\}}$ $(i)\ \boldsymbol{x(n+2)}$ (ii) $\boldsymbol{x(-n)}$ (iii) $\boldsymbol{x(-n+2)}$ **01 Credit Point**

f) Explain discrete time Fourier series for analysis of signals. **01 Credit Point**

Q2.

a) Explain the following types of system.

i] Instantaneous and Dynamic system.

ii] Causal and Non causal system.

iii] Invertible and non invertible system. **02 Credit Point**

b) A periodic signal x(t) is represented by a trigonometric Fourier Series.

x(t) = 2 + 3cos2 t + 4sin 2t+ 2sin (3t+30°) – cos (7t + 150°) Express this series as a compact trigonometric Fourier series and sketch amplitude and phase spectra.

02 Credit Point

c) State and prove the following properties of Fourier transform.

1) Convolution.
2) Frequency Shifting.
3) Time Shifting **02 Credit Point**

d) Explain Parallel and Cascade realization of system **01 Credit Point**

e) Explain finding natural and forced response in classical solution of linear difference equation of discrete time system. **02 Credit Point**

f) Explain z-transform and existence of z-transform **01 Credit Point**

Q3.

a) Find $Y_0\ (t)$, the zero input component of the response for an LTIC system described by the following differential equation $(D^2 + 3D + 2)y(t) = Dx(t)$ When the initial conditions are $Y_0\ (0) = 0\ Y_o^{'} = -5$ **02 Credit Point**

b) Explain numerical computation o1' D, of Courier Series using DFT. **02 Credit Point**

c) Find the Fourier transform of $x(t) = rect(t/\tau)$ using time convolution property **02 Credit Point**

d) Determine Laplace transform of sine pulse and their ROC **02 Credit Point**

e) Test the linearity of following system

i) $y(n) = nx^2(n)$ **01 Credit Point**

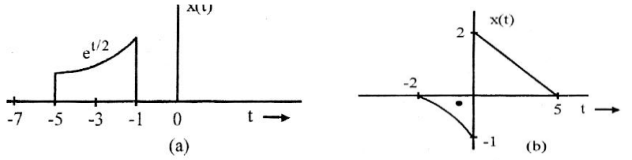
f) Find the Fourier transform of $x(n)$ where

$x(n) = 1 \quad 0 \le n \le 4$ **01 Credit Point**

$= 0$ otherwise

Q4.

a) For the signal illustrated in figure (a) and (b). sketch x(-t) which is time reserved x(t)



02 Credit Point

b) Explain Dirichlet conditions for convergence o1"Fourier series. **02 Credit Point**

c) Explain the relation between Fourier transform and Laplace transform**.** **02 Credit Point**

d) Find the inverse Laplace transform of $\frac{-3}{(s+2)(s-1)}$ if ROC is $-2 < Re(s) < 1$ **02 Credit Point**

e) Explain the following discrete time system.

i) static and dynamic ii) Causal and non causal **01 Credit Point**

f) State and prove the following properties of DTFT

i)Time reversal ii) Periodicity **01 Credit Point**