Q. P. Code: 39337

Time: 3 Hours

Marks: 100

Note :
1) All questions are compulsory.
2) Make suitable assumptions wherever necessary and state the assumptions made.
3) Numbers to the right indicate marks.

Q. 1 **Attempt *any two* of the following** 10

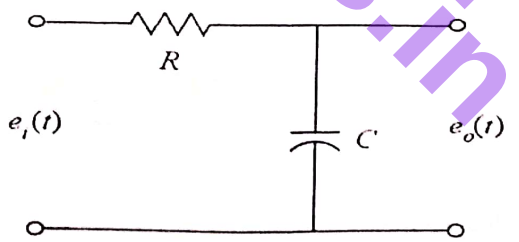
(a) Defined term system .discuss the classification of it?
(b) state and prove parsevals theorem for Fourier transform?
(c) What are the advantages of Digital Signal Processing (DSP) over Analog Signal Processing(ASP)?
(d) Find even and and odd components of $x(t)=e^{jt}$

Q. 2 **Attempt *any three* of the following** 15

(a) State any five properties of unit impulse function?
(b) Defined term signal and give the classification of signals?
(c) Give graphical representation of any four test signals withexpression?
(d) Test following signals are periodic or non periodic
i. $x[n]=\cos 2n$ ii. $X(t)=\sin 2t+\cos\frac{\pi}{3}t$
(e) Determine the following signals are energy,power,or neither.
i.$x(t)=e^{-at}u(t)$ ii. $x[n]=u[n]$
(f) Explain stability in Linear Time Invariant system. What is the condition forsystem?

Q. 3 **Attempt *any three* of the following** 15

(a) Find laplace transform of $\sin \alpha t.\cos \beta t$
(b) State any five properties of Laplace transform .
(c) Defined laplace transform .Find the Laplace transform of tu(t).
(d) Obtain Laplace transform for step and Impulse Responses given Circuit



(e) Using various laplace tranform properties ,derive the laplace transforms of followings signals
i.$x(t)=tu(t)$ ii.$x(t)=te^{-at}u(t)$
(f) find inverse laplace transform of followings X(S)

I. $X(S)=\frac{2S+4}{S^2+4S+3}$ II. $X(S)=\frac{S^2+4S+7}{S^2+3S+2}$

Q. 4 **Attempt *any three* of the following** 15

(a) State and explain the properties of z- transform
(b) Explain initial and final value theorem in terms of z transform with 0ne example.
(c) A finite sequence x[n] is defined as X[n]={5,3,-2,0,4,3} find X(Z)
(d) Give relation between Z and laplacetransform
(e) Find inverse laplace transform ofX (Z)=$3/(Z-3)|Z|>3$
(f) Define z-Transform. Obtain z transform x[n]=a^nn[n]

Q.5Attempt *any three* of the following 15

(a) Compute the impulse response of the system
y(n)=0.7y(n-1)-0.12y(n-2)+x(n-1)+x(n-2)
(b) Check whether the system F[x(n)]= n[x(n)]^2 is Linear and Time-Variant.
(c) What is convolution? What are the properties of convolution?
(d) What is the condition for z-Transform to exist?
(e) What is frequency response? What are the properties of it?
(f) Compare the properties of two-sided z-transform with those of one-sided.

Q. 6 **Attempt *any three* of the following** 15

(a)State and explain the properties of Discrete Fourier transform.
(b)Define Discrete Fourier Transform (DFT) for signum function
(c)Compute Linear and Circular Periodic Convolutions of the sequence
(i) x1[n]= {1,1,2,2} andx2[n]= {1,2,3,4} using DFT.
(d)Compute four point DFT of X[n]={0,1,2,3}
(e)State the relationship between DFT and z-Transform
(f)What are the methods used to perform Fast Convolution. Explain anyone method giving all the steps involved to perform Fast Convolution.

Q. 7 **Attempt *any three* of the following** 15

(a)State the advantages of Digital filters.
(b)Describe elliptical filters in detail
(c)Obtain the system functions of normalized Butterworth filters for order N = 1 & 2.
(d)Explain the procedure for designing an FIR filter using Kaiser window.
(e) Explain the effects of windowing. Define Rectangular and Hamming window functions?
(f)Describe the Inverse Chebyshev filters.

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