B.TECH SEM – IV(2007 COURSE) (INF. TECH.) : WINTER - 2017

SUBJECT: SIGNALS AND SYSTEMS

Day: **Friday** Time: **02.30 PM TO 05.30 PM**

Date: **24/11/2017** **W-2017-2424** Max. Marks: 80

N.B.:

1) **Q. No. 1** and **Q. No. 5** are **COMPULSORY**. Out of the remaining attempt any **TWO** questions from each section.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in **SEPARATE** answer book.
4) Draw neat labeled diagrams **WHEREVER** necessary.

SECTION-I

Q.1 **a)** State and explain periodic and non- periodic signals. **(05)**

b) Differentiate between memory and memoryless systems. **(05)**

c) Consider two LTI systems connected in series. Show that overall system response does not depend on order of interconnection. **(04)**

Q.2 **a)** Find the energy and power of following signal **(07)**

$x(t) = A\cos(e\pi f_0 t + \theta)$

b) Compare the following signals **(06)**

i) Energy and power signals

ii) Even and odd signals

Q.3 **a)** Show the following system is time variant **(07)**

$y(t) = t\,x(t)$

b) Explain causal system with example. **(06)**

Q.4 **a)** Determine if the system described by following equations are causal or non-causal **(07)**

i) $y(n) = \cos x(n)$ *ii)* $y(n) = x(n) + n\,x(n-1)$

iii) $y(n) = |x(n)|$ *iv)* $y(n) = x(-n+2)$

b) Explain Feedback interconnection of systems. **(06)**

P. T. O.

SECTION-II

Q.5 **a)** State and explain time shifting property of Fourier series. **(05)**

b) State and explain linearity property of Laplace transform. **(05)**

c) Find Z- transform of $x(n) = \delta(n-k)$ **(04)**

Q.6 **a)** Obtain Fourier transform of a unit step function. **(07)**

b) Prove linearity property of Fourier transform. **(06)**

Q.7 **a)** Find the Laplace transform of **(07)**
$x(t) = (t-3)^2$

b) Prove convolution property of Laplace transform. **(06)**

Q.8 **a)** Explain time shifting property of Z- transform. **(07)**

b) Definition of ROC and significance of ROC in Z- transform. **(06)**

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