

**G 1539**

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Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, MAY 2016**

**Fourth Semester**

Branch : Applied Electronics and Instrumentation/Electronics and communication/  
Electronics and Instrumentation Engineering

AI 010 403/EC 010 403/EI 010 403—SIGNALS AND SYSTEMS (AI, EC, EI)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 3 marks.*

1. What do you mean by BIBO stability ?
2. Give four properties of the ROC of Z transform.
3. List out different ways of interconnecting any two systems.
4. Sketch the following signals :

(a)  $-2r(t)$ .

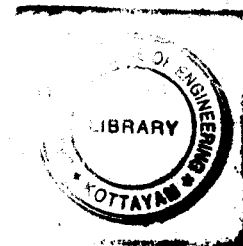
(b)  $-2u(t-1)$ .

5. Find whether the following systems are stable or not :

(a)  $h(t) = e^{-1t}u(t-2)$ .

(b)  $h(t) = e^{2t}u(-1-t)$ .

(c)  $h(n) = 5^n u(n-3)$ .



(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Sketch the following signals :

(a)  $u(-t+1)$ .

(b)  $r(-t+2)$ .

Turn over

7. Determine  $y(t)$  by convolution integral if  $x(t) = e^{-2t} u(t)$  and  $h(t) = u(t+2)$ .

8. Find  $z$ -transform of the following sequence :

$$x(n) = a^n \cos(\Omega_0 n) u(n).$$

9. Determine the pole zero plot and ROC of  $x(n) = (y_2)^{|n|}$ .

10. What is aliasing ? Explain.

(5 × 5 = 25 marks)

### Part C

Answer all questions.

Each full question carries 12 marks.

11. Check whether the given system is stable or dynamic, linear or non-linear, causal or non-causal time invariant or time variant :

$$y(t) = \frac{d^2 y(t)}{dt^2} + 3t \frac{dy(t)}{dt} + y(t) = x(t).$$

Or

12. Explain the classification of signals with examples.

13. Find the Fourier transform of rectangular pulse described below :

$$x(t) \begin{cases} 1, & |t| < a. \\ 0, & |t| > a. \end{cases}$$

Or

14. Find the fourier transform of the following signals :

(a) Gaussian signal.  $x(t) = e^{-at^2}$

(b) Gaussian modulated cosine signal  $x(t) = e^{-at^2} \cos \Omega_c t$ .



15. Find DTFT of the following signals :

$$x(n) = u(n - k).$$

$$x(n) = a^n u(n).$$

$$x(n) = \delta(n + 2) - \delta(n - 2).$$

Or



16. Write in detail about important properties of DTFT.

17. The signal  $x(t) = 10 \cos(10 \pi t)$  is sampled at a rate of 8 samples per second. plot the amplitude spectrum for  $|\Omega| \leq 30 \pi$ . Can the original signal be recovered from samples? Explain.

Or

18. Find the half power frequency of a fifth order Chebyshev I low pass filter with a 2db pass band edge at 1kHz.

19. (a) Find Laplace transform of the following :

(i)  $x(t) = u(t - z).$

(ii)  $x(t) = t^2 e^{-2t} u(t)$

(iii) State and prove initial value theorem of Laplace transform.

Or

20. (a) Find  $z$ -transform of the signal  $x(n) = (\sin \omega_0 n) u(n)$  and find ROC.

(b) Explain the properties of ROC of  $x(z)$ .

(5 × 12 = 60 marks)