A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 54B04

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Fourth Semester

Biomedical Engineering

15UBM404 - PRINCIPLES OF SIGNALS AND SYSTEMS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. An example of a discrete set of information/system is _____ CO1 R

   (a) the trajectory of the Sun (b) data on a CD

   (c) universe time scale (d) movement of water through a pipe

2. Which of the following is a stable system? CO1 R

   (a) $y(t) = tx(t)$ (b) $y(t) = t^2 x(t)$ (c) $y(t) = e^t x(t)$ (d) $y(t) = e^{-t}u(t)$

3. Fourier series is useful for frequency domain analysis of _____ CO2 R
   Signals.

   (a) periodic (b) aperiodic

   (c) harmonic (d) none of the above

4. Fourier transform of Gaussian pulse will be CO2 R

   (a) squared sinc pulse (b) another Gaussian pulse

   (c)sinc pulse (d) impulse Train

5. The convolution of of two signals is given by - CO3 R

   (a) $y(t)= x(t)*h(t)$ (b) $x(t)= y(t)*h(t)$ (c) $y(t) *h(t)= x(t)$ (d) All of the above

6. Given that $H(s) = e^{-4S}$. What is the impulse response of the system? CO3 R

   (a) $e^{-4t} u(t)$ (b) $u(t-4)$ (c) $\delta(t-4)$ (d) $e^{4t} u(t)$

7. A band limited continuous time signal with maximum frequency f_m, sampled at a frequency f_s, can be fully recovered from its samples, proved that — CO4 R

(a) $f_s \geq 2f_m$ (b) $f_s = 2f_m$ (c) $f_m \geq 2f_s$ (d) $f_s = f_m$

8. Z transform is also called as _____ — CO4 R

(a) bilateral (b) two sided Z transform

(c) Both A and B (d) None of these

9. When number of delays is equal to order of the system, the structure is called_____ — CO5 R

(a) non canonic (b) canonic (c)direct form I (d) Cascade form

10. What the methods find inverse Z transform? — CO5 R

(a) Partial fraction expansion (b) Contour integration

(c) Convolution method (d) All the above

PART – B (5 x 2= 10Marks)

11. Find the fundamental period T of the signal of the following continuous signal? X(t)=20cos(10πt+π/6). — CO1 R

12. State Dirichlets conditions. — CO2 R

13. Draw the block diagram of the LTI system described by $\frac{dy(t)}{dt} + y(t) = 0.1x(t)$. — CO3 R

14. Define Sampling theorem? — CO4 R

15. Define unilateral and bilateral Z transform. — CO5 R

PART – C (5 x 16= 80Marks)

16. (a) (i) Determine whether the following signals are periodic or aperiodic. If periodic find the fundamental period — CO1- App (8)

$$x(t) = sin2\pi t + cos\pi t.$$

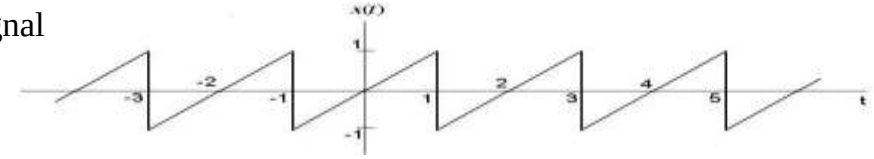
(ii) Determine whether the following signals are power or energy signals, Determine power and energy of the signals — CO1- App (8)

$$x(n) = (0.5)^n\, u(n).$$

Or

(b) Explain in detail about the classification of systems with examples — CO1- App (16)

17. (a) Determine the Fourier series representation for the following signal CO2- App (16)



OR

(b) Find the Laplace Transform and its ROC for the signal $x(t) = e^{-2|t|}$. CO2- Ana (16)

18. (a) Determine the impulse response h(t) of the system given by the differential equation$d^2y(t)/ dt^2 + 2y(t) = x(t)$ with all initial conditions to be zero CO3- Ana (16)

Or

(b) The input-output of a causal LTI system are related by the differential equation$\frac{d^2y(t)}{dt^2} + 6\frac{dy(t)}{dt} + 8y(t) = 2x(t)$. Find the impulse response h(t) and output response y(t) of this if x(t) = u(t). CO3- Ana (16)

19. (a) State and prove sampling theorem for low pass band limited signal and explain the process of reconstruction of the signal from its samples. CO4- U (16)

Or

(b) Compute the response of the system. (**An)-CO4** CO4- App (16)
Y(n) = 0.7 y(2n-1) – 0.12y(n-2) + x(n-1) + x(n-2)

20. (a) Obtain the cascade and parallel realization of (**U)-CO5** CO5- App (16)
Y(n)-1/4y(n-1)-1/8y(n-2)=x(n)+3x(n-1)+2x(n-2)

Or

(b) LTI discrete time system y(n) = 1.5y(n-1)-0.5y(n-2)+x(n)+x(n-1) is given an input x(n) = u(n). Find the transfer function and impulse response. CO5- App (16)