Question Paper Code: 54B04

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Biomedical Engineering

15UBM404 - PRINCIPLES OF SIGNALS AND SYSTEMS

(Regulation 2015)

Duration: 1.15 hrs   Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Periodic signals are   CO1-R

   (a) $x(t+T) = X(t)$ (b) $x(t-T) = x(t)$ (c) $x(n+mN) = x[n]$ (d) All the above

2. Power signals are this signals with   CO1-R

   (a) $0 < E < \infty, P = 0$ (b) $0 < E < \infty, P = \infty$ (c) $0 < P < \infty, E = \infty$ (d) $0 < P < \infty, E = 0$

3. Laplace transform of $x(t) = t$ is   CO2-R

   (a) $\dfrac{2}{s^2}$ (b) $\dfrac{1}{s^2}$ (c) s^2 (d) $\dfrac{1}{s}$

4. Phase spectrum $\Phi(\omega)$ is an   CO2-R

   (a) Even function   (b) Odd Function

   (c) Both (a) and (b)   (d) Neither even nor odd function

5. Impulse response is the output of _____ system due to impulse   CO3-R
   input applied at time=0?

   (a) Linear   (b) Time varying

   (c) Time invariant   (d) Linear and time invariant

6. Find the convolution sum of sequences x1[n] = (1, 2, 3) and x2[n] =   CO3-R
   (2, 1, 4).

   (a) {2, 5, 12, 11, 12}   (b) {2, 12, 5, 11, 12}   (c) {2, 11, 5, 12, 12}   (d) {-2, 5,-12, 11, 12}

7. Aliasing occurs when sampling frequency w_s CO4-R

   (a) $w_s = 0$ (b) $w_s \geq 2w_m$ (c) $w_s \geq w_m$ (d) $w_s < 2w_m$

8. z- transforms of $x[-n]$ is CO4-R

   (a) $-x(z)$ (b) $x(-z)$ (c) $x\left[\dfrac{1}{z}\right]$ (d) $\dfrac{1}{x(z)}$

9. If $x[n]$ is real and odd, then its discrete Fourier series coefficient c_k CO5-R
   will be

   (a) real   (b) odd   (c) imaginary   (d) both (a) and (c)

10. Z – transforms of $nx[n]$ is CO5-R

    (a) $\dfrac{dX(z)}{dz}$ (b) $z\dfrac{dX(z)}{dz}$ (c) $\dfrac{d^2X(z)}{dz^2}$ (d) $-z\dfrac{dX(z)}{dz}$

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. How the unit impulse function $\delta(t)$, unit step function u (t) and ramp function r (t) can be related? Also give the Mathematical representation and graphical representation of the above three functions. CO1-App (8)

12. Obtain the Fourier co-efficient and write the quadrature form of a fully rectified sine wave. CO2-Ana (8)

13. Using Laplace transform of x(t). Give the pole – zero plot and find ROC of the signal x(t) . $x(t) = e^{-b|t|}$ For both b>0 and b<0. CO3-App (8)

14. State and prove sampling theorem for a band limited signal. CO4-U (8)

15. Convolve the following sequences CO5-App (8)

    $x[n] = a^n u[n], a < 1$

    $h[n] = u[n]$

54B04