Reg. No: ☐☐☐☐☐☐☐☐☐☐

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year I Semester (R16) Regular Examinations November 2017
SIGNALS AND SYSTEMS
(Electronics and Communication Engineering)

Time: **3 hours**   Max. Marks: **60**

(Answer all Five Units **5 X 12 = 60** Marks)

UNIT-I

1   Find whether the following signals periodic or not? if periodic determine the
         fundamental Period
         a) *sin 24πt*
         b) *3sin100πt+4 cos200t*
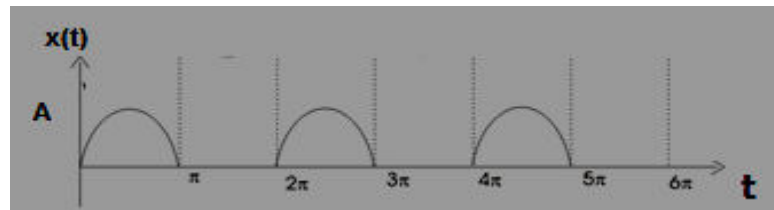   c) $e^{j4\pi t}$
         d) $x(t) = 2\cos(10t + 1) - \sin(4t - 1)$ 12M

OR

2   Find the Fourier series expansion of the half wave rectified sine wave shown
         in figure.

                                                                                                         12M

UNIT-II

3   a   State and prove the convolution and multiplication properties of Continuous
          time Fourier transform?   6M
      b   Find the Fourier Transform of the following signals:
          i). Impulse Function
          ii). $x(t)=e^{-at}u(t)$ 6M

OR

4   Determine the Fourier transform of $x(t) = e^{-|t|}$ and plot the Fourier
         spectrum.   12M

UNIT-III

5   Derive the transfer function and impulse response of an LTI system.   12M

OR

6   a   Determine the impulse response h(t) of the system given by the differential
          equation $d^2y(t)/dt^2 + 3dy(t)/dt + 2y(t) = x(t)$ with all initial conditions to be
          zero.   4M
      b   Evaluate the output response of the system described by the differential
          equation $d^2y(t)/dt^2 + 6dy(t)/dt + 8y(t) = dx(t)/dt + x(t)$, when the input
          signal x(t) =u(t) and the initial conditions are y(0⁺)=1,dy(0⁺)/dt =1.   8M

UNIT-IV

7 a State and prove the Parseval's theorem for energy signal.   6M
   b State and prove the frequency convolution theorem with Fourier transforms.   6M

OR

8 a Explain the detection of periodic signals in the presence of noise by
      autocorrelation.   12M

UNIT-V

9   Determine Z transform and draw the pole zero plot with ROC for each of
      the following signals.

      i). $x(n) = (0.5)^n u(n) - (1/3)^n u(n)$.

      ii). $x(n) = (1/2)^n u(n) + (1/3)^n u(n-1)$.   12M

OR

10 a Find the Laplace transform of the signal $x(t) = e^{-at} u(t) - e^{-bt} u(-t)$ and also find
      its ROC   6M
   b Find the inverse Laplace transform of:
      $X(s) = 1/ s(s+1) (s+2) (s+3)$ 6M

*** END ***