7. (a) Prove that ideal filters have constant gain, constant group and phase delays. 10

(b) Find the transfer function for Low Pass RC filter. Also draw its magnitude and phase spectrum. 10

Section–D

8. Find the z-transform of the following signals :

(i) $\mu(k)$

(ii) $(k+1)\,a^k$

(iii) $b^k \sin ak$

(iv) $\cos ak$ 20

9. Find inverse z-transform of the following :

(i) $\dfrac{z^2}{z^3 - 1.7z^2 + 0.8z + 0.1}$

(ii) $\dfrac{z^2 - 5}{(z-1)(z-2)^2}$

B.Tech. 4th Semester (ECE) - (F-Scheme)
Examination, May–2018
SIGNALS AND SYSTEMS
Paper–EE–228–F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt **five** questions. **Question No. 1 is compulsory** and attempt **one** question from each of the four sections.*

1. (a) Discuss energy and power signals. 5

(b) Write down the time differentiation and integration property of Fourier transform. 5

(c) A continuous time causal stable LTI system has the following response

$$H(jw) = \frac{1 - j2w}{1 + j2w}$$

Determine (i) $|H(jw)|$ and

(ii) Group Delay T(w) 5

(d) Explain S to Z plane mapping with help of an illustration. 5

Section–A

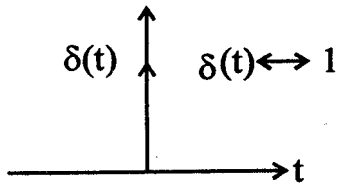
2. Explain the following signals with help of illustrations:
   (i) Continuous time and Discrete time
   (ii) Periodic and Non-Periodic
   (iii) Even and Odd
   (iv) Energy and Power 20

3. Discuss the following signals :
   (i) Unit step
   (ii) Unit impulse
   (iii) Unit ramp
   (iv) Exponential 20

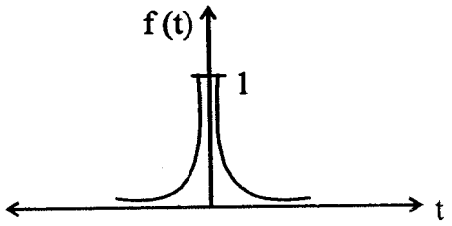
Section–B

4. (a) Obtain the Fourier transform of following :

   (i) Impulse function



   (ii) Exponentially decaying function



10

   (b) Obtain the Fourier transform spectrum $G_T(w)$ of the rectangular pulse defined as

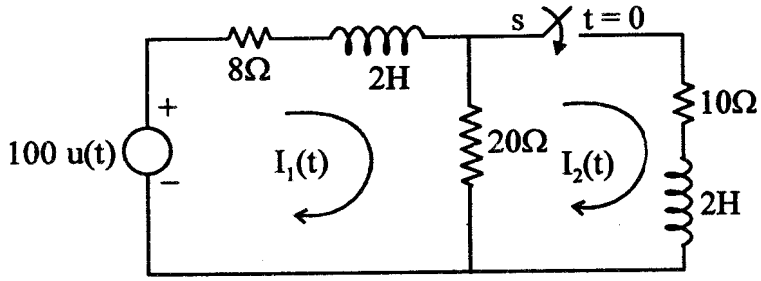
$$g_T(t) = \begin{cases} 1 & |t| \le T/2 \\ 0 & \text{otherwise} \end{cases}$$

   Also sketch the gate function. 10

5. State all the properties of Fourier transform with their proofs. 20

Section–C

6. (a) In given circuit switch is closed at t = 0. Find out the currents $I_1(t)$ and $I_2(t)$.



   (b) Find the two sided Laplace Transform and ROC of the signal $f(t) = e^{3t} u(-t) + e^{2t} u(t)$. 10