



HCU-003-027301 Seat No. _____

M. Sc. (ECI) (Sem. III) (CBCS) Examination

October / November - 2017

Paper - IX : Circuits & Networks
(Old Course)

Faculty Code : 003

Subject Code : 027301

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

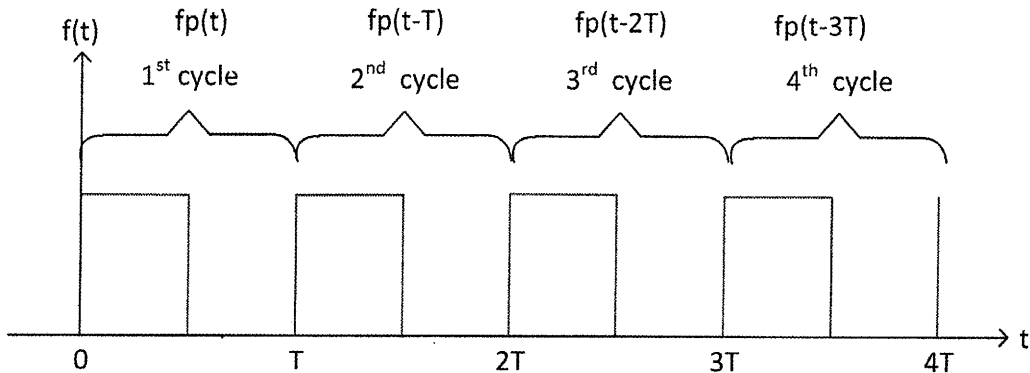
1 Answer any seven from the following : 14

- (1) What is the difference between step function and translated step function? Explain with proper diagrams.
- (2) Define an impulse function. Differentiate an impulse function and a unit impulse function.
- (3) Derive the Laplace transform of $f(t) = e^{-at}$
- (4) Find the Laplace transform of $f(t) = \cos^2 t$
- (5) Verify the initial value theorem for $f(t) = 5e^{-4t}$
- (6) Derive the voltage and current equations for an inductor in S-domain when initial current i_0 is flowing in it.
- (7) Explain transfer function with one example.
- (8) Write on voltage transfer and current transfer ratio for a two port Network.
- (9) Write the h-parameters and ABCD parameters.
- (10) Write the definitions of filter and attenuator.

2 Answer any **two** from the following :

(A) Find the Laplace transform of $\delta'(t)$. 7

(B) Obtain the Laplace transform of periodic function 7
 $f(t) = f(t + \tau)$.



(C) Discuss how the partial fraction expansion is 7
obtained when the roots are real and repeated.

3 Answer the following :

(A) Prove the initial and final value theorems. 7

(B) Discuss the natural response of an R_c circuit using 7
s-domain analysis where capacitor is initially charged to V_0 volts considering both the forms of capacitor in S-domain, i.e., parallel and series forms.

OR

3 Answer the following :

(A) Discuss the response a series RC circuit where 7
input is generated by impulse source by switching a charged capacitor.

(B) What is complex frequency? Discuss the physical 7
interpretation of complex frequency.

- 4 Answer the following :
- (A) A network function has two real poles. Discuss its time response using pole zero concepts with proper diagrams. 7
- (B) Discuss how the inverse Laplace transform of a given network function is obtained from the graphical analysis of its pole zero diagram. 7
- 5 Answer any two from the following :
- (A) Derive Z-parameters and Y-parameters. 7
- (B) Derive following for the band pass filter : 7
- (1) Z_1, Z_2 and $Z_1 Z_2$.
- (2) $f_0 = \sqrt{f_1 f_2}$
- (C) Draw and explain full series equalizer. 7
- (D) Write on symmetrical T-Attenuator. 7
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