



**Circuits Analysis - II (EE-201) – Final Term Examination**  
**Spring (2017)**

**Time Allowed: 2hrs**

**Max Marks: 50**

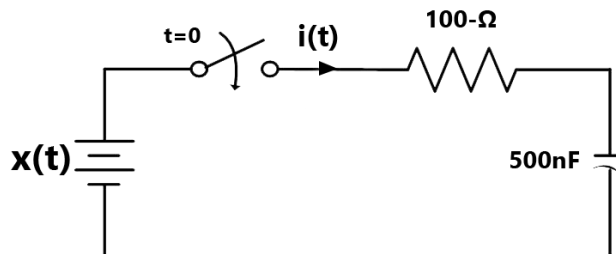
**DIRECTIONS:**

1. Don't exceed your answer from 4 lines for a theory question having 2 or less marks.
2. Don't write questions. Only write Question number and part number, e.g., Q-1(iv).
3. No sharing of calculators, rulers or any helping material is allowed during exam.

**Q: No. 1:** Answer the following questions briefly. (2x5=10)

- i) We use  $t=0$  for finding Laplace Transform of a signal and  $\omega=-\infty$  for finding Inverse Laplace. Why we consider the negative frequency quadrants for doing so?
- ii) What conditions do we follow while solving differential equations for finding residue of a current bearing element and a voltage storing element? Explain it by involving Laplace of integral and differential functions.
- iii) Amongst transient or steady state response, which response is not considered for significantly higher values of time and why?
- iv) A sine-wave of angular frequency  $\omega = 1\text{-rad/sec}$ , having no phase angle, is applied to a real world system and it is continuously decaying with an exponential value of  $2e^{-at}$ . Find the composite input signal and draw it on a graph.
- v) Find the Laplace transform of the input signal obtained in **Q. No. 1 - part (iv)**.

**Q: No. 2:** A continuous time voltage signal is given by  $x(t) = te^{-2t}$ . (10)



**Fig. 1**

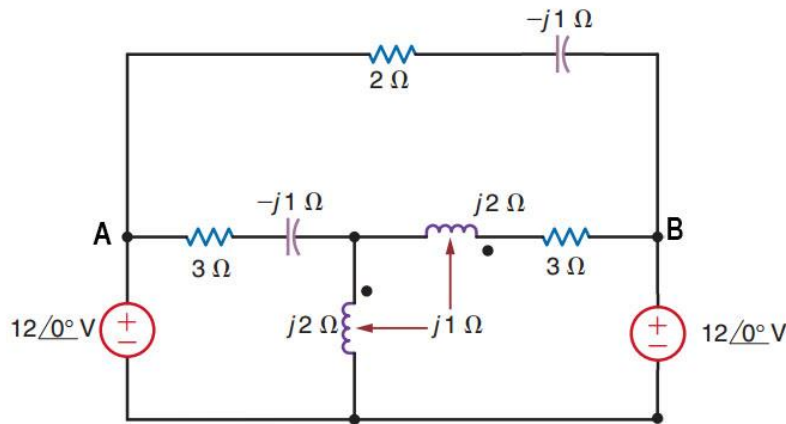
- i) Find  $X(s)$ . (2)
- ii)  $x(t)$  is applied to the system given in **Fig. 1**; Write down the expression of current for  $t>0$  for the given system. (6)
- iii) What will be the value of transient and steady state current? Explain it referring to initial and final value theorem. (2)



**Q: No. 3**

Find voltage ( $V_{AB}$ ) for the circuit given in Fig. 2;

(10)



**Fig. 2**

**Q: No. 4:**

The impedance parameter matrix  $Z = [10+j2, j2; j2, 5+j2]$  defines a two port network.

- i) Draw the equivalent T circuit. (6)
- ii) If the circuit connects a source of  $20\angle 30^\circ$  V to a resistance of  $10\text{-}\Omega$ , find the voltage across the resistor. (4)

**Q: No. 5:**

- i) Write down the DC, sine and cosine terms for trigonometric and exponential Fourier series. (3)
- ii) A specific saw-tooth wave possesses time period of **1-sec**, having its peak value of **2-volts** at 1-sec. Find its Fourier coefficients  $a_0, a_1, a_2, b_1$  and  $b_2$ . (6)
- iii) Write 2 uses of Fourier series in everyday life or in signal processing. (1)

**THE END**