Reg. No.										

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Manipal

INSPIRED BY LIFE

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

III SEMESTER B.S. DEGREE EXAMINATION –MAY 2016

SUBJECT: LINEAR NETWORKS: TRANSIENT ANALYSIS (EE 231)

(BRANCH: COMPUTER ENGG \ E&C \ E&E)

24TH MAY, 2016

Time: 3 Hours **Max. Marks: 100**

✓ **Answer ANY FIVE Questions.**

1A. Determine whether or not the signal x(t) is periodic. If the signal is periodic determine its fundamental period and frequency in radian. **6**

$$x(t) = \cos\left(\frac{\pi t}{3}\right) - \mathrm{Sin}\left(\frac{\pi t}{5}\right) + 6\cos\left(\frac{\pi t}{4} + \frac{2\pi}{3}\right)$$

1B. Write the equation of the waveform shown in Fig. 1B in terms of step and ramp signals. Also, sketch its first derivative. **8**

1C. Evaluate the integrals

I. $\int_{-\infty}^{\infty} \delta(t-5)\left[u(t-2) - r(t-4)\right]dt$ **6**

II. $\int_{-\infty}^{\infty} \cos t\left[\delta(t-\pi) - \delta(t-\frac{\pi}{2}) + \delta^{11}(t-\frac{\pi}{4})\right]dt$

2A. The first derivative of the function f(t) is given by $f^1(t) = 2u(t) - 4u(t-1) + u(t-2) + u(t-3) + u(t-4) - u(t-5)$ Sketch $f^1(t)$ and f(t). **8**

2B. For the waveform shown in Fig.2B, determine the value of K such that

(i) $\int_{-\infty}^{\infty} f(t)dt = 0$ (ii) $\int_{0^+}^{\infty} f(t)dt = 0$ **4**

2C. Find odd and even components of the signal shown in Fig.2C **8**

3A. In the circuit of Fig. 3A, the switch is closed at t = 0. Find v_1 and $\frac{dv_1}{dt}$ at t = 0^+. **10**

3B. In the network shown in Fig.3B, the switch is opened at t=0. At t=0+, solve for the values of dv/dt and d^2v/dt^2 if I=10amp, R=1000Ω and C=1uf. **10**

4A. In the network shown in Fig.4A the switch is closed at t = 0. Determine i $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0^+. **10**

4B. Find the Laplace transform of the periodic waveform shown in Fig. 4B **10**

5A. In the network shown in Fig.5A, switch moves from position 1 to position 2 at t=0. Find the total current response. Use Laplace transforms method. **10**

5B. In the network of Fig.5B, switch is changed from position 1 to position 2 at t = 0. Find the expression for current through the inductor for t > 0 using time domain analysis. **10**

6A In the network of Fig.6A, switch is opened at t = 0. Determine the current $i_L(t)$ for $t \geq 0$. **10**

6B In the network of Fig.6B, switch is changed from A to B at t = 0. Find the current response using Laplace Transform method. **10**

7A A voltage of $v(t) = 6e^{-3t}$ is applied to a series RL network with R = 5Ω and L = 0.25H at t = 0. Find the voltage across the inductor for t > 0 using convolution integral theorem. **10**

7B A function f(t) has its poles at s = 0 and s = -2 and zero at s = -5. The final value of the function is 5. Find f(t). **10**

8A Plot the pole zero diagram for the system $\frac{(s+1)(s^2+1)}{s(s+2)(s^2+4)}$. Obtain f (t) using pole zero diagram. **10**

8B Using convolution integral obtain the f(t) of a function $F(s) = \frac{3}{s(s^2+4)}$. Then verify your answer with pole zero map. **10**

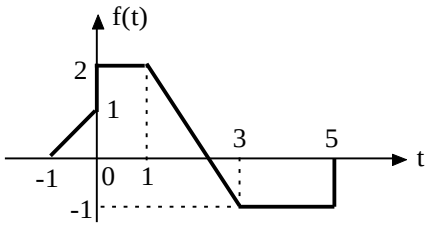

Fig.1B

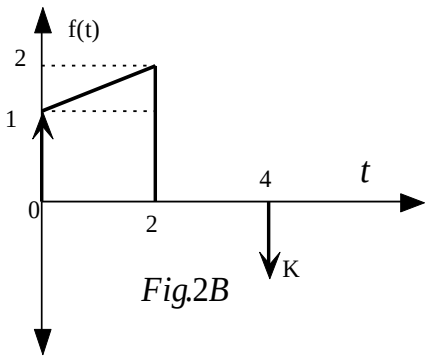

Fig.2B

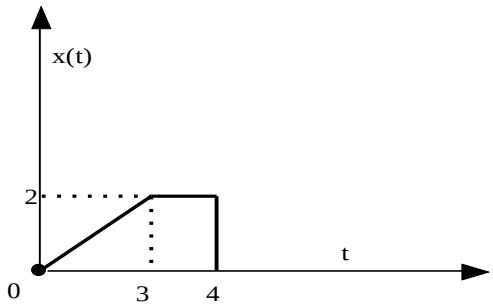

Fig.2C

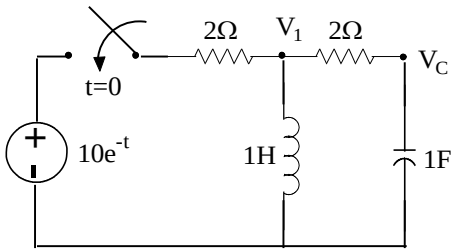

Fig. 3A

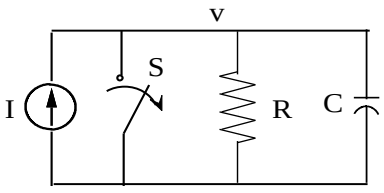

Fig. 3B

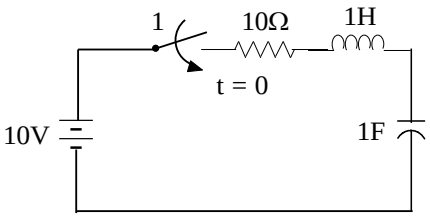

Fig. 4A

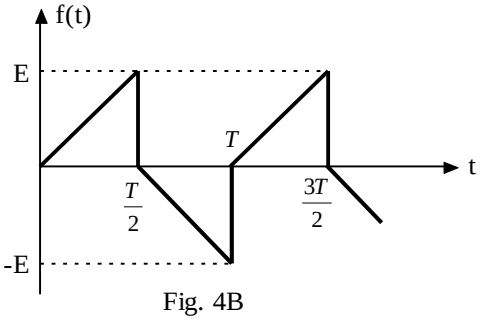

Fig. 4B

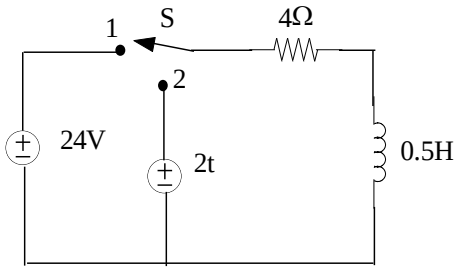

Fig. 5A

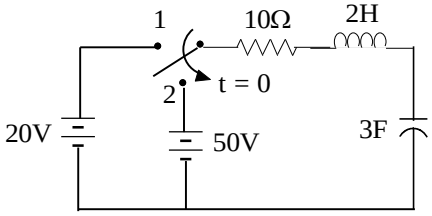

Fig. 5B

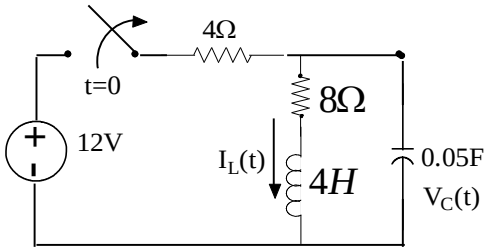

Fig. 6A

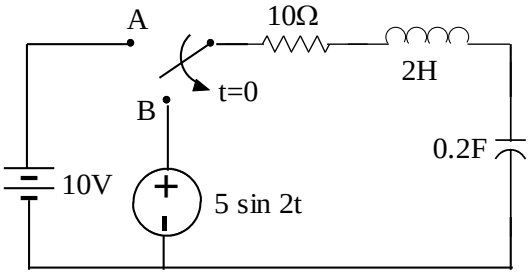

Fig. 6B