Reg. No. | | | | | | | | | |

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent Institution of MAHE, Manipal)

III SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, MAY 2018

SUBJECT: ELECTRICAL CIRCUIT ANALYSIS [ELE 2101]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 03 MAY 2018** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. In the circuit of Fig. Q1A, determine the current through 1Ω resistor using Superposition theorem. ***05***

1B. For the circuit shown in Fig Q1B, find the value of R_L so that maximum power is transferred. Also, find the maximum power transferred. ***05***

2A. For the periodic waveform v(t)(containing ramp and sinusoidal functions) shown in Fig Q2A, find V(s). ***02***

2B. Sketch the odd and even components of the waveform shown in Fig. Q2B. ***03***

2C. Three impendences (8+j6) Ω, (2-j2) Ω and (R+j5) Ω are connected in parallel across a 100 V, 50 Hz single phase AC supply. Draw the current locus if the resistance 'R' varies from zero to infinity and hence determine (i) minimum current (ii) maximum current (iii) current at resonance and (iv) value of 'R' at resonance ***05***

3A. The waveform for the first derivative of the function is shown in Fig Q3A.

(i) Obtain the equation for f(t) and sketch it.

(ii) Sketch u[f(t)]. ***03***

3B. In the network shown in Fig Q3B, switch 'K' is opened at t=0 after the network has attained a steady state with the switch closed. (a) Find an expression for the voltage across the switch at t = 0^+. (b) If the parameters are adjusted such that $i(0^+)=1$ and $\frac{di(0^+)}{dt} = -1$, what is the value of the first derivative of the voltage across the switch? ***02***

3C. In the network of Fig. Q3C, switch is changed from 'a' to 'b' at t = 0, steady state being achieved before t = 0. Find an expression for the current through the inductor for t > 0 using time domain analysis. ***05***

4A. In the network of Fig. Q4A, switch is changed from 'a' to 'b' at t = 0, steady state being achieved at 'a' before t = 0. Determine the voltage across the capacitor for t > 0 using Laplace Transform method. ***05***

4B. Find the Laplace Transform of the periodic waveform shown in Fig. Q4B. ***03***

4C. The voltage across a circuit is given by

$$V(s) = \frac{s^2 + 3s + 2}{s^3 + 3s^2 + 3s + 1}$$

Determine the initial & final value of the voltages across the circuit. ***02***

5A. For the function below, find the residues by pole-zero plot and hence find i(t). ***03***

$$I(s) = \frac{5(s+1)(s+2)}{s(s^2+4)}$$

5B. Find the Y parameters for the resistive network shown in Fig Q5B. Hence, derive h parameters from the obtained Y parameters. ***05***

5C. Determine Y parameters of the network shown in Fig. 5C ***02***

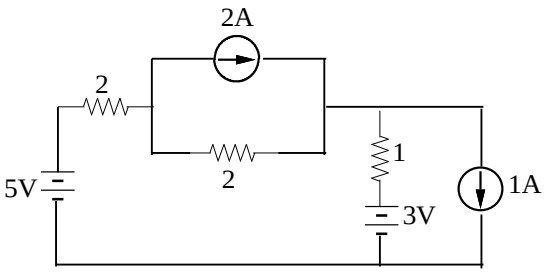

Fig. Q1A

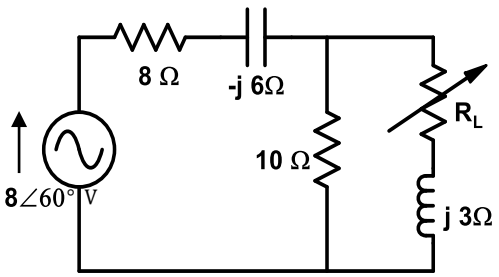

Fig Q1B

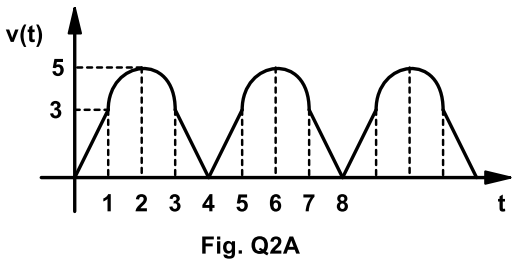

Fig. Q2A

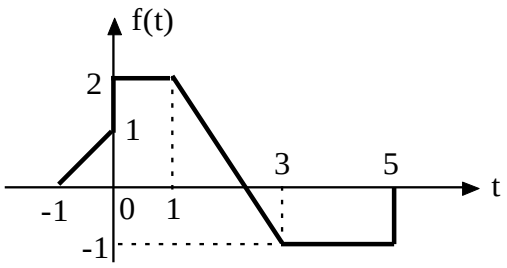

Fig. 2B

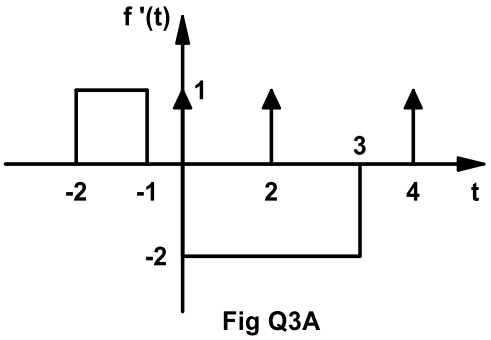

Fig Q3A

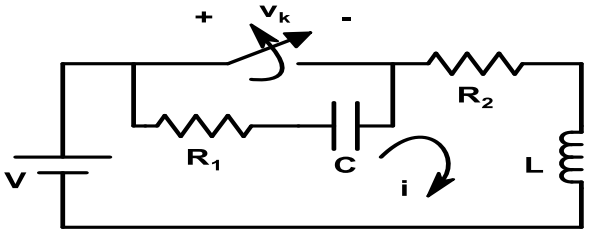

Fig Q3B

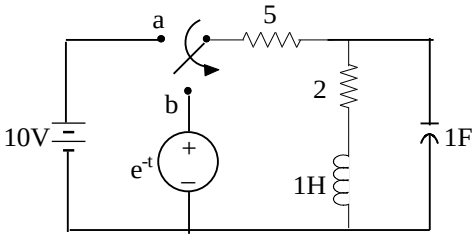

Fig. Q3C

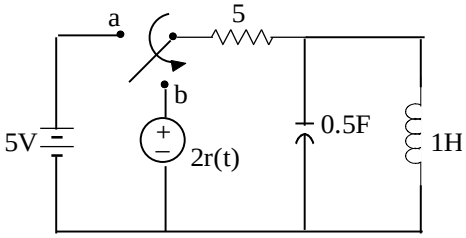

Fig. Q4A

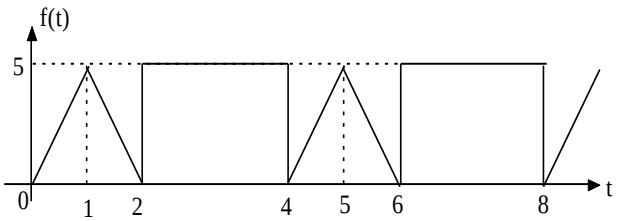

Fig. Q4B

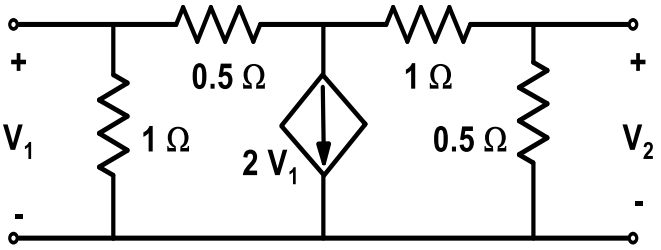

Fig Q5B

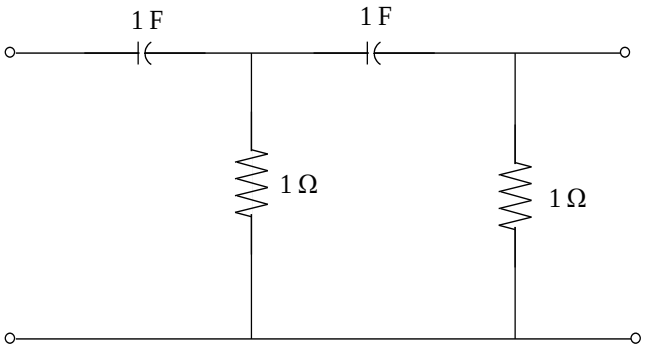

Fig. 5C