Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

THIRD SEMESTER B. TECH. (INSTRUMENTATION AND CONTROL ENGG.)

END SEMESTER DEGREE EXAMINATIONS, NOVEMBER - 2018

SUBJECT: ELECTRICAL CIRCUIT ANALYSIS [ICE 2101]

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates: (i) Answer **ALL** questions.
(ii) Missing data may be suitably assumed.

1A For the circuit shown in Fig. 1A, determine the loop currents and also the power supplied by the 2A source 4M

1B Determine the current i_1 in the circuit shown in Fig. 1B. 3M

1C For the circuit shown in Fig. 1C, find the value of R_L for maximum power to the load. Also, calculate the maximum power delivered to the load and maximum power transferred from the source. 3M

2A In the circuit shown in Fig. 2A, the switch is opened at t=0, a steady state having previously been attained. Find the complementary function, particular solution and the total solution for $v_C(t)$. 4M

2B Determine $v(0+)$, $\frac{dv(0+)}{dt}$ and $\frac{d^2v(0+)}{dt^2}$ for the circuit shown in Fig. 2B. 3M

2C For the circuit shown in Fig. 2C, determine the value for inductance 'L' at resonance condition. 3M

3A With reference to the circuit shown in Fig. 3A, obtain an algebraic expression fot $i_L(t)$ and $v_1(t)$ for time $t \geq 0$. 3M

3B The current source in the circuit of Fig. 3B suddenly increases from 15A to 22A at t=0. Find the voltage Vs at (i) t = 0- (ii) t = 0+ (iii) t = ∞+ 2M

3C Sketch the waveform for the following function: 3M

$$f(t) = 3u(t) - r(t) + r(t-1) - 5u(t-3) + r(t-3) - r(t-4) + 2u(t-6)$$

3D Given that $x(t) = 3u(t-1) - 2u(t-3)$ and $h(t) = 2u(t) - 2u(t-2)$, find $y(t) = x(t) * h(t)$ using Laplace transform. 2M

4A Use Laplace transform to find the expressions for $i_1(t)$ and $i_2(t)$ shown in Fig. 4A. 5M

4B It is found that the Z-matrix for a given two-port network is as follows: 3M

$$Z = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

If a voltage source (V_S) of 1V with an internal resistance R_S=1kΩ is connected across the input port, while a load resistance R_L = 1kΩ is connected across the output port, determine the

voltage gain $\frac{V_O}{V_S}$.

4C Obtain the short-circuit admittance parameters in terms of open-circuit impedance parameters. 2M

5A Obtain the Y-parameters for the circuit shown in Fig. 5A. 5M

5B For the circuit shown in Fig. 5B, draw the graph as well as a tree which consists of the 3Ω. 5M
Construct the tie-set matrix and find the branch currents and voltages.

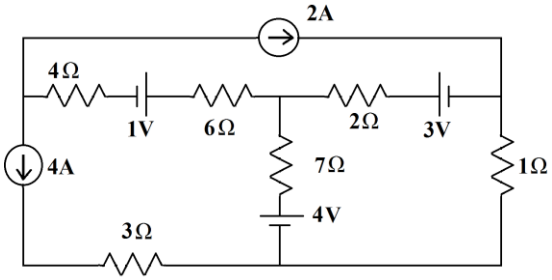

Fig. 1A

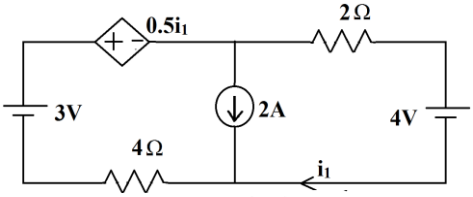

Fig. 1B

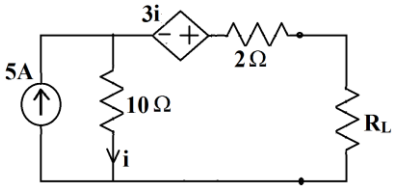

Fig. 1C

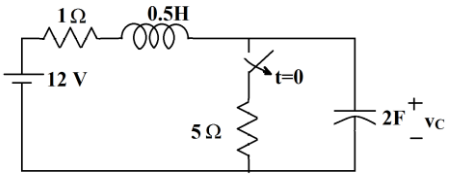

Fig. 2A

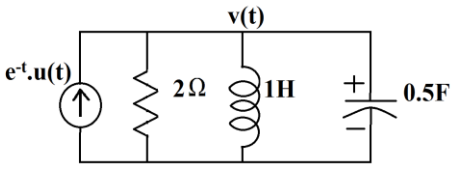

Fig. 2B

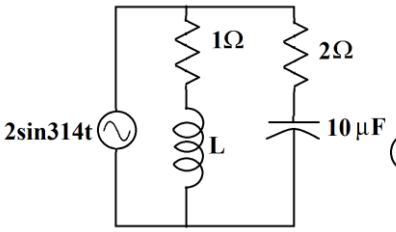

Fig. 2C

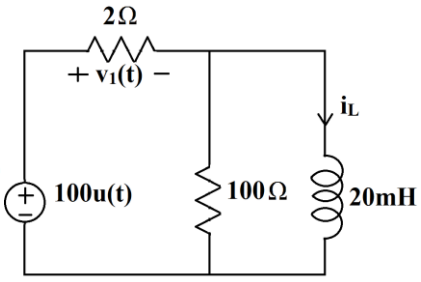

Fig. 3A

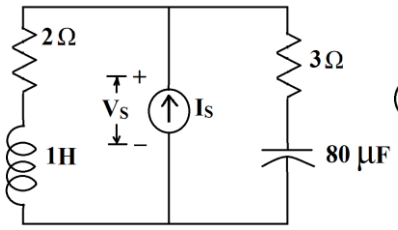

Fig. 3B

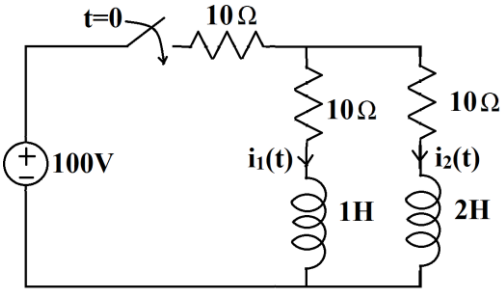

Fig. 4A

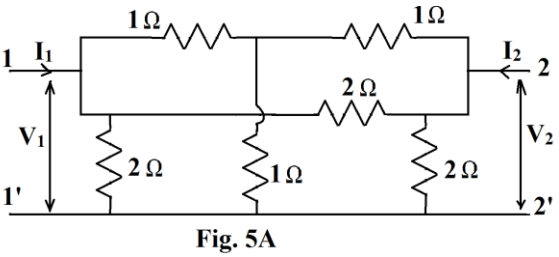

Fig. 5A

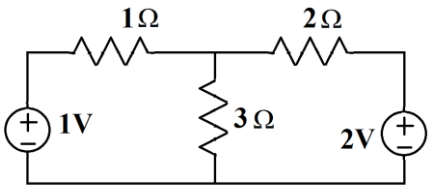

Fig. 5B

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