CBCS SCHEME

USN

18EC32

Third Semester B.E. Degree Examination, Aug./Sept. 2020
Network Theory

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Using source shifting and source transformation techniques, find the value of V_x for the circuit in Fig.Q1(a).

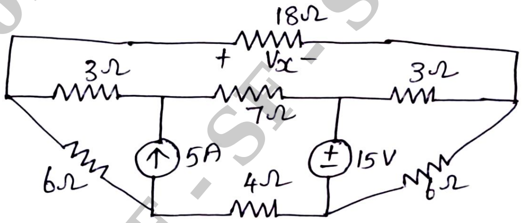

Fig.Q1(a) **(10 Marks)**

b. Use Mesh analysis to the circuit shown in Fig.Q1(b) to find the power supplied by 4V source.

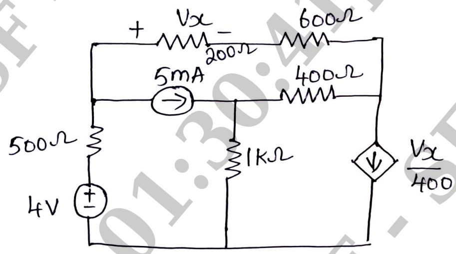

Fig.Q1(b) **(10 Marks)**

OR

2 a. Find the resistance R_{xy} for the circuit shown in Fig.Q2(a) using star–delta transformation.

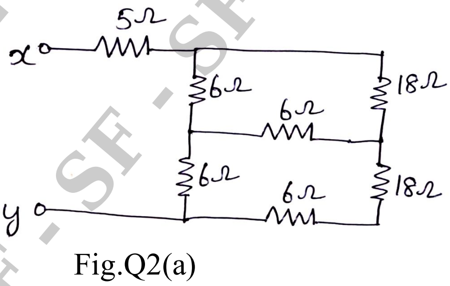

Fig.Q2(a) **(10 Marks)**

b. Find I_1 in the circuit of Fig.Q2(b) using nodal analysis.

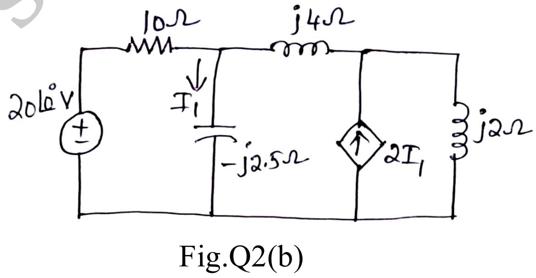

Fig.Q2(b) **(10 Marks)**

Module-2

3 a. Use superposition theorem to find i_0 in the circuit shown in Fig.Q3(a).

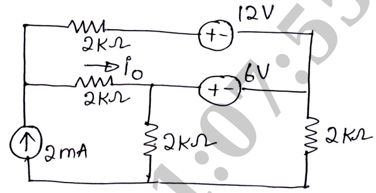

Fig.Q3(a) **(10 Marks)**

b. Find the Thevenin's and Norton's equivalent circuits at the terminals a–b for the circuit in Fig.Q3(b).

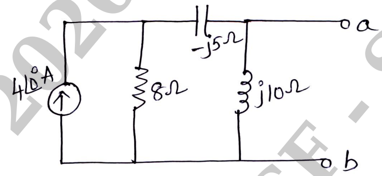

Fig.Q3(b) **(10 Marks)**

OR

4 a. Find the current through $(10 - j3)\Omega$ using Millman's theorem Refer Fig.Q4(a).

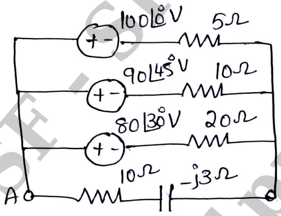

Fig.Q4(a) **(10 Marks)**

b. Find the value of R_L for the network shown in Fig.Q4(b) that results in maximum power transfer. Also find the value of maximum power.

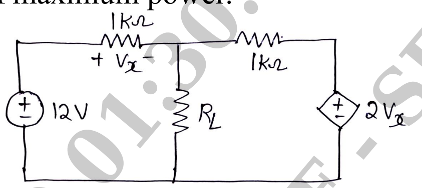

Fig.Q4(b) **(10 Marks)**

Module-3

5 a. For the circuit shown in Fig.Q5(a), the switch K is changed from position 1 to position 2 at t = 0. Steady–state condition having been reached at position 1. Find the values of

$i, \frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$

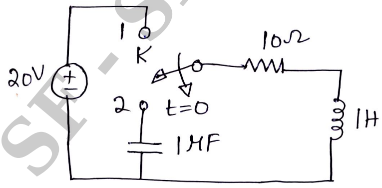

Fig.Q5(a) **(10 Marks)**

b. For the circuit shown in Fig.Q5(b), steady-state is reached with switch K open. At t = 0, the switch is closed. Determine the values $V_a(0^-)$ and $V_a(0^+)$.

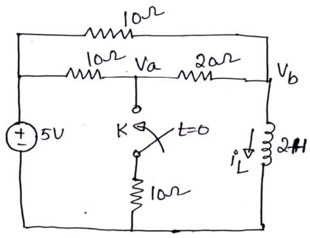

Fig.Q5(b) **(10 Marks)**

OR

6 a. In the network shown in Fig.Q6(a), the switch K is opened at t = 0. Find $v, \frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$.

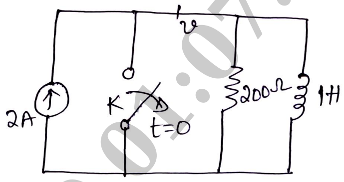

Fig.Q6(a) **(10 Marks)**

b. For the circuit shown in Fig.Q6(b) find :

i) $i(0^+)$ and $v(0^+)$ ii) $\frac{di(0^+)}{dt}$ and $\frac{dv(0^+)}{dt}$ iii) $i(\infty)$ and $v(\infty)$.

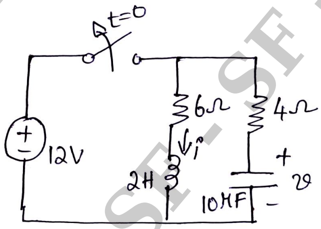

Fig.Q6(b) **(10 Marks)**

Module-4

7 a. State and prove initial–value theorem and final-value theorem. **(10 Marks)**

b. For the circuit of Fig.Q7(b).

i) Write a differential equation for $i_L(t)$ ii) find $I_L(s)$ iii) solve for $i_L(t)$.

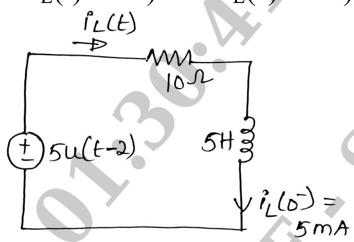

Fig.Q7(b) **(10 Marks)**

OR

8 a. Find the Laplace transform of the periodic signal x(t) shown in Fig.Q8(a).

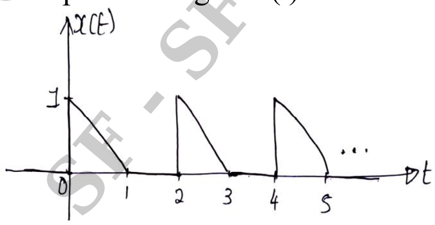

Fig.Q8(a) **(10 Marks)**

b. For the circuit shown in Fig.Q8(b), steady state is reached with the 100V source. At t = 0, switch k is opened. What is the current through the inductor at $t = \frac{1}{2}$ seconds.

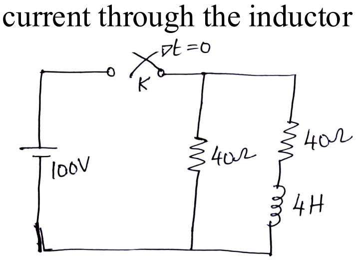

Fig.Q8(b) **(10 Marks)**

Module-5

9 a. Explain h-parameters. Express h-parameters in terms of z-parameters. **(10 Marks)**

b. Find y-parameters for the circuit shown in Fig.9(b).

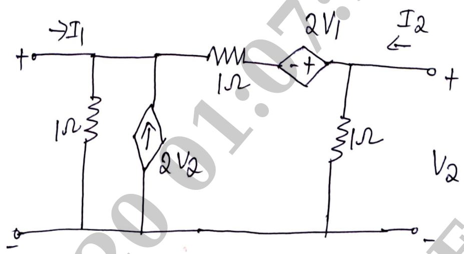

Fig.Q9(b) **(10 Marks)**

OR

10 a. A series RLC circuit has R = 10Ω, L = 0.1H and C = 100μF and is connected across a 200V, variable frequency source, find :

i) Resonant frequency
ii) Impedance at this frequency
iii) Voltage drops across l and c at this frequency
iv) Quality factor
v) Bandwidth. **(07 Marks)**

b. Find the value of R_1 such that the circuit given in Fig.10(b) is resonant.

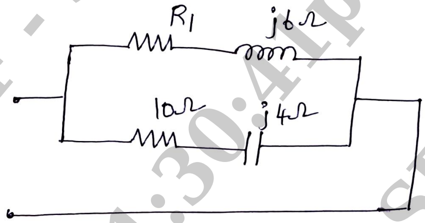

Fig.10(b) **(07 Marks)**

c. A series RLC circuit has R = 10Ω, L = 0.01H and C = 0.01μF and it is connected across 10mV supply. Calculate :

i) f_0 ii) Q_0 iii) Bandwidth iv) f_1 and f_2 v) I_0. **(06 Marks)**

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