USN | | | | | | | | | | 15EE32

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Electric Circuit Analysis

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. Find 'I_a' shown in the circuit in Fig Q1(a) using mesh analysis.   **(08 Marks)**
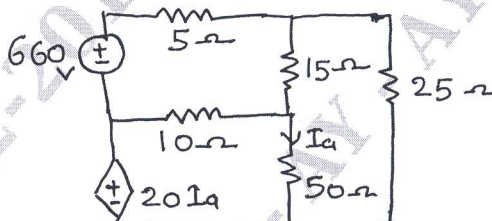

Fig Q1(a)

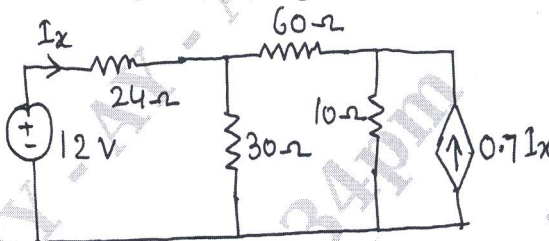   b. Find the I_x in the circuit show in Fig Q1(b) using source transformation.

Fig Q1(b)   **(08 Marks)**

OR

2 a. Find V_1 in the circuit shown in Fig Q2(a) using node analysis,. When $V_2 = 20$ volts.
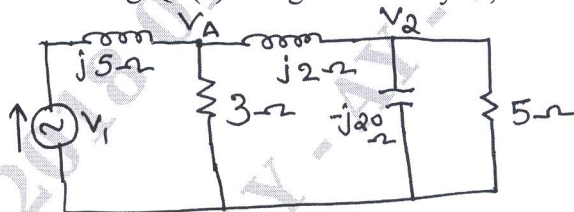

Fig Q2(a)   **(06 Marks)**

   b. A series RLC circuit consist of R = 50Ω, L = 0.2H, C = 10μF, with an applied voltage of 20V. Determine resonant frequency half power frequencies, Q – factor and B.W of the circuit.   **(05 Marks)**

   c. Find the current I in the circuit show in Fig Q2(c). Using star delta transformation. **(05 Marks)**
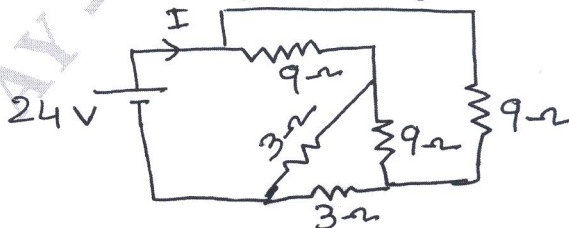

Fig Q2(c)

Module-2

3 a. State maximum power transfer theorem. **(03 Marks)**

b. For the circuit shown in Fig Q3(b). Find current 'I' using super position theorem. **(05 Marks)**

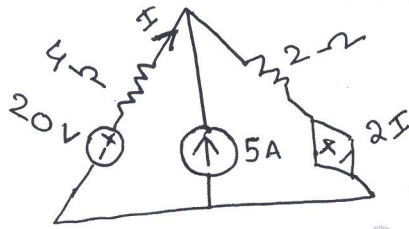c. Find V_x in the circuit shown in Fig Q3(c) and hence verify reciprocity theorem.
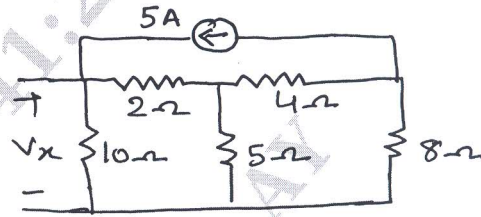

Fig Q3(b)   Fig Q3(c)   **(08 Marks)**

OR

4 a. For the circuit shown in Fig Q4(a) obtain the Thevnin's equivalent across A – B.
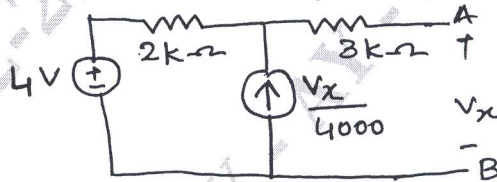

Fig Q4(a)   **(06 Marks)**

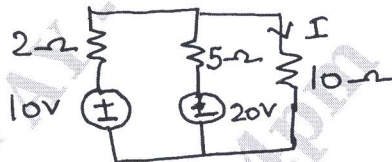b. Find I using Millman's theorem for the network shown in Fig Q4(b).

Fig Q4(b)   **(04 Marks)**

c. Find the value of i_b in the Fig Q4(c) using Norton's theorem.

Fig Q4(c)   **(06 Marks)**

Module-3

5 a. On the circuit shown in Fig Q5(a). the switch 'S' removed from a to b at t = 0.

Find i, $\dfrac{di}{dt}$, $\dfrac{d^2i}{dt^2}$ at t = 0^+ steady state is achieved when switch is at a. **(08 Marks)**

b. In the circuit shown in Fig Q 5(b) switch K is opened at t = 0. Find the value of

V_1 $\dfrac{dv}{dt}$, $\dfrac{d^2v}{dt^2}$ at t = 0^+. **(08 Marks)**
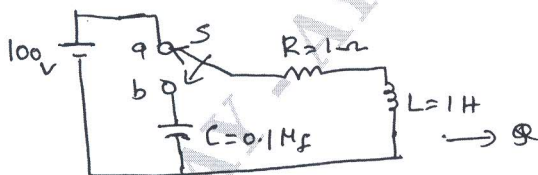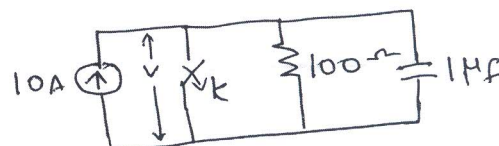

Fig Q5(a)   Fig Q5(b)

OR

6   a.   In the circuit shown Fig Q6(a) determine the complete solution of current when switch is closed at t = 0.   **(08 Marks)**

   b.   In the circuit sown in Fig Q6(b). Determine $V_a(0^-)$, $V_a(0^+)$ at t = 0. Steady state is reached with switch open.   **(08 Marks)**
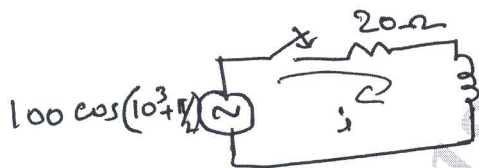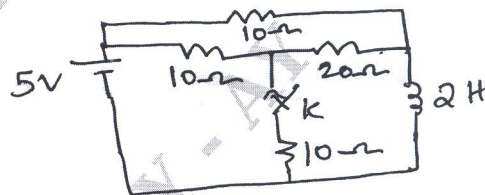

Fig Q6(a)

Fig Q6(b)

Module-4

7   a.   Use initial and final value theorem to find F(0) and F(α)

$$F(s) = \frac{s^3 + 7s^2 + 5}{s(s^3 + 3s^2 + 4s + 2)} .$$ **(04 Marks)**

   b.   State and prove initial value theorem and final value theorem.   **(06 Marks)**

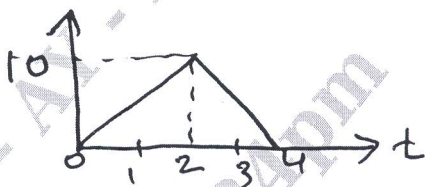   c.   Obtain the Laplace transform of the function shown in Fig Q7(c)   **(06 Marks)**

Fig Q7(c)

OR

8   a.   Derive the Laplace transform of a periodic signal.   **(08 Marks)**

   b.   Obtain the Laplace transform of the given wave form in Fig Q8(b).   **(08 Marks)**

Fig Q8(b)

Module-5

9   a.   A three phase, 400V, 4 wire system has a star connected load with $Z_A = (10 + j0)\Omega$, $Z_B = (15 + j10)\Omega$, $Z_c = (0 + j5)\Omega$. Find the line currents and current through neutral wire.   **(06 Marks)**

   b.   Define Z and Y parameters.   **(04 Marks)**

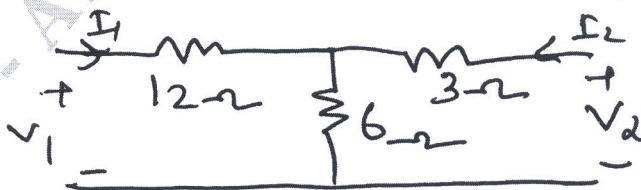   c.   Find z parameters for the circuit in Fig Q9(c).

Fig Q9(c)   **(06 Marks)**

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OR

10 a. Find $V_c(t)$ in the circuit shown in Fig Q10(a) assuming zero initial condition. **(08 Marks)**
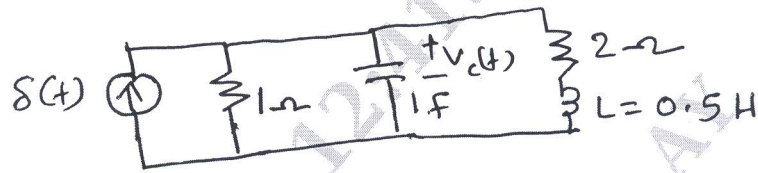

Fig Q10(a)

b. The pole – zero plot for an R-L-C circuit, driving point admittance, is as shown in Fig Q10(b). Find the values of R, L ,C. **(08 Marks)**
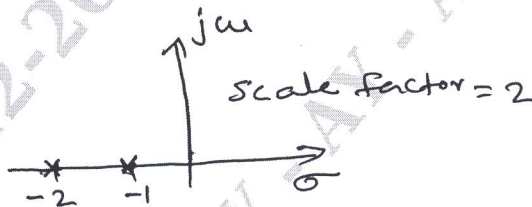

Fig Q10(b)

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