Third Semester B.E. Degree Examination, Dec 2018

17EE 32ELECTRICAL CIRCUIT ANALYSIS

Time: 3 hrs. **MODEL PAPER** Max. Marks: 100

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

Module – 1

1 a. Perform source transformation and find a single voltage source in series with a resistance for the circuit shown in fig 1(a). 6 marks

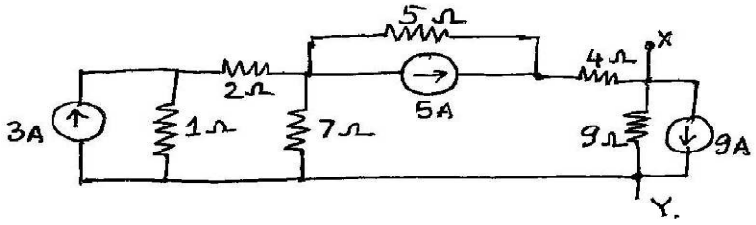

Fig 1(a)

b. For the circuit shown in fig 1(b), solve for loop currents 6 marks

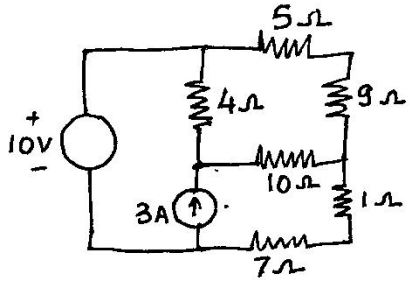

Fig 1(b)

c. Find the equivalent delta connection for the circuit shown in fig 1(c). 8 marks

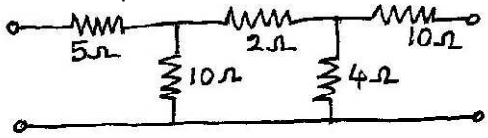

Fig1(c)

OR

2 a. Find the current in the 10 Ohm resistor for the circuit shown in fig 2(a). Use star delta transformation. 6 marks

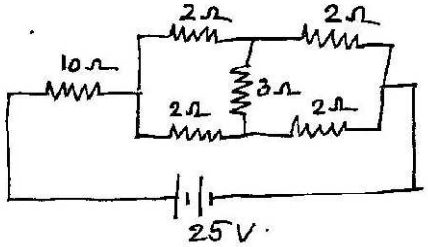

Fig 2(a)

b. For the circuit shown in fig 2(b) determine all node voltages. 8 marks

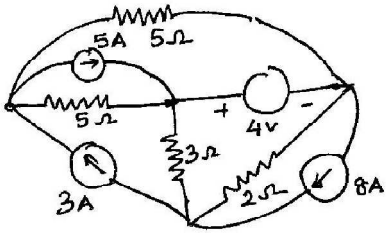

Fig 2(b)

c. The node voltages equations for an electrical circuit are as follows: 6 marks
Draw the circuit.

Module – 2

3 a State and explain superposition theorem. 6marks

b For the circuit shown in fig 3(b), find the Thevenin's equivalent circuit across X-Y terminals. 8 marks

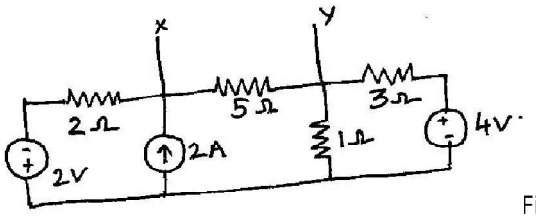

Fig 3(b)

c For the circuit shown in fig 3(c), find the Norton's equivalent across X-Y terminals. 4 marks

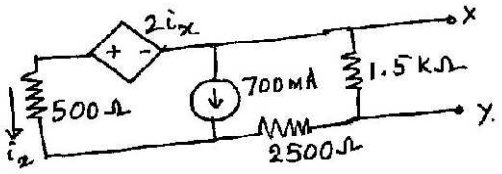

Fig 3 (c)

OR

4 a State and explain Norton's theorem 6 marks

b In the network shown in fig. 4(b) determine the current I using superposition theorem. 8 marks

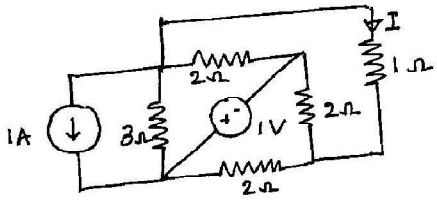

Fig 4 (b)

c Find Vx and verify reciprocity theorem for the circuit shown In fig 4 (c) 6 marks

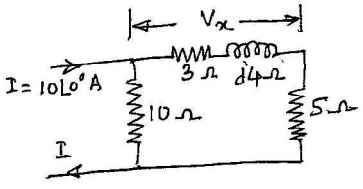

Fig 4 (c)

Module – 3

5 a A series R-L-C circuit is energized by a variable frequency AC supply. Derive the expressions for half power frequencies and bandwidth. 8 marks

b For the circuit shown in fig 5(b) find the frequency at which the circuit will be at resonance. If the capacitor and inductors are interchanged, what will be the 6 marks

value of the resonance frequency?

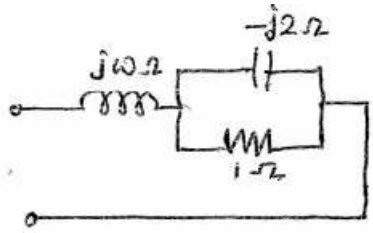

Fig 5(b)

c Explain the behavior of circuit elements under switching action(t = 0 and t= infinity), 6 marks

OR

6 a Determine i, di/dt and d^2i/dt^2 at t = 0+ when the switch is moved from position 1 to position 2 in the circuit shown in fig.6(a) 8 marks

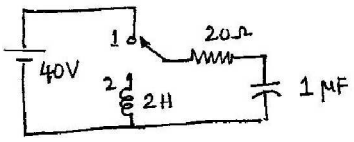

Fig 6 (a)

b In a series RLC circuit, the resistance, inductance and capacitance are 10 ohms, 100 mH and 10 microfarad. Calculate ω_0, ω_1 and ω_2. Also find bandwidth and selectivity. 7 marks

c Show that the circuit shown in fig 6 (c) resonant at supply frequency. 5 marks

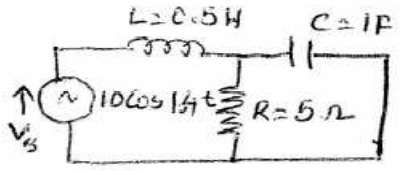

Fig 6(c)

Module – 4

7 a State and prove initial value and final value theorems 8 marks

b Show that the Laplace transform of a periodic function is $1/(1 - e^{-Ts})$ times the Laplace transform of the first pulse. Where T is the period of the function. 6 marks

c Obtain the Laplace transform of the pulse shown in fig. 7(c) 6 marks

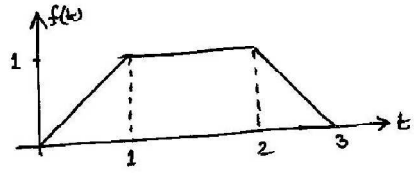

Fig 7(c)

8 a Determine the Laplace transform of half rectified sine wave of maximum value V 6 marks

b Evaluate the Laplace transform of the periodic signal shown in fig. 8(b) 6 marks

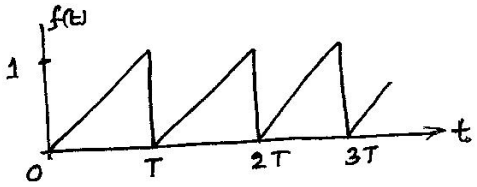

Fig 8(b)

c Find the initial value and final value of the following functions: 8 marks

(i) $I(s) = \frac{6.67(S+250)}{S(S+166.7)}$ (ii) $I(s) = \frac{S^3+7S^2+5}{S(S^3+3S^2+4S+2)}$

Module – 5

9 a The delta connected load impedance shown in the fig.9(a) is supplied by a balanced 400 V three phase 50Hz supply. Phase sequence is RYB. Determine 8marks

the phase and line currents.

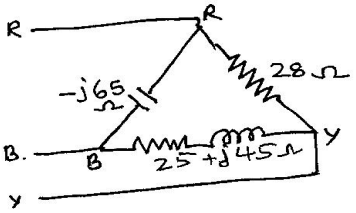

Fig 9 (a)

b Find the z - parameters for the network shown in fig. 9 (b) 6 marks

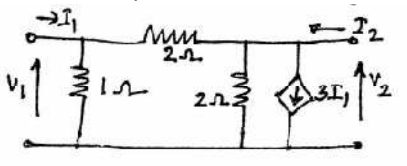

Fig.9 (b)

c Find Y_{11}, Z_{21},h_{21} and D from 6 marks

$2V_1 + 4\ I_2 = I_1$

$8\ I_2 = V_2 + 6V_1$

OR

10 a For the network shown in fig. 10 (a), determine Y and Z parameters 8 marks

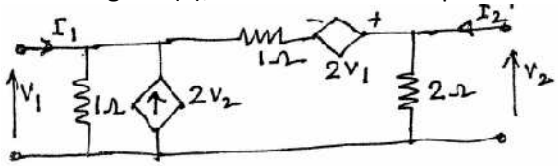

Fig.10 (a)

b Given$I_1 = 0.25V_1 - 0.2\ V_2$ 4 marks

$I_2 = -\ 0.2V_1 + 0.1\ V_2$ Find T - parameters

c The unbalanced three phase 4 wire star connected load impedance shown in the fig.10(c) is supplied by a balanced 400 V three phase 50Hz supply.Phase sequence is RYB. Determine the voltage at the star point of the load with respect to supply neutral. Also determine the line currents. 8 marks

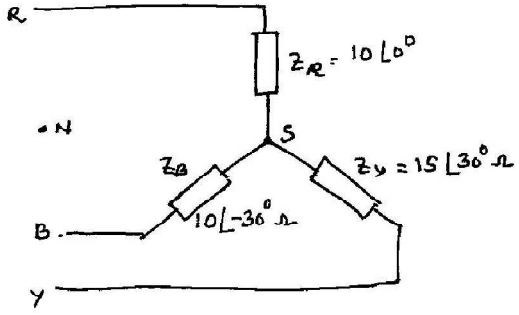

Fig 10(c)