

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), November 2016

B. Tech. in Electrical Engineering, Semester III

ECE

Roll No.....

EE-301: Network Analysis & Synthesis

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

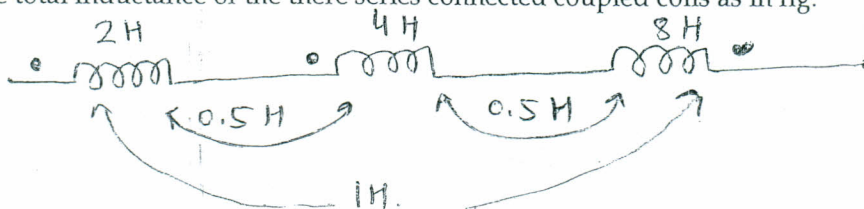
Q.1A Objective type multiple choice questions (10 questions @ 1 mark) 10

- i. Constant voltage source is (a) Active bilateral (b) Passive and bilateral (c) Active and unilateral (d) Passive and unilateral
- ii. If an impedance Z_L is connected across a voltage source V with source impedance Z_s' then for maximum power transfer, the load impedance must be equal to (a) source impedance Z_s (b) complex conjugate of Z_s (c) real part of Z_s (d) imaginary part of Z_s
- iii. The graph of an electrical network has n nodes and b branches. The number of links with respect to the choice of a tree is given by (a) $b - n + 1$ (b) $b + n$ (c) $n - b + 1$ (d) $n - 2b - 1$
- iv. The coupling between two magnetically coupled coils is said to be ideal if the coefficient of coupling is (a) zero (b) 0.5 (c) 1 (d) 2
- v. Laplace transform of unit step function is (a) $1/s^2$ (b) $1/s$ (c) s (d) s^2
- vi. Final condition for inductor with current is (a) Current source (b) Short ckt. (c) Current source with short ckt. in series (d) Current source with short ckt. in parallel.
- vii. The system is said to be stable, if and only if (a) all poles lie on right half of s plane (b) some poles lie on right half of s plane (c) all poles does not lie on right half of s plane (d) none of the above
- viii. Transfer admittance is defined as (a) The ratio of transform voltage at one port to current transform at other port (b) The ratio of transform current to voltage transform at same port (c) The ratio of transform current at one port to voltage transform at other port (d) none of the above.
- ix. The condition $AD - BC = 1$ for a two port network implies that the network is (a) Reciprocal network (b) Lumped element network (c) Loss less network (d) Unilateral element network.
- x. Two port network are connected in cascade, the combination is to be represented as a single two port network, the parameters of the network are obtained by multiplying the individuals (a) Z parameter matrix (b) H parameter matrix (c) Y parameter matrix (d) Transmission parameter matrix

Q.2 Short answer type questions (4 questions @ 2.5 marks) 10

- i. Why is power system never operated under maximum power transfer condition?
- ii. What is meant by duality? Give the requirement for the network to be dual of other.
- iii. Define transfer impedance and admittance function.
- iv. What are the Z parameters? Why they are called open circuit impedance parameters?

Q.3A Calculate the total inductance of the three series connected coupled coils as in fig. 05

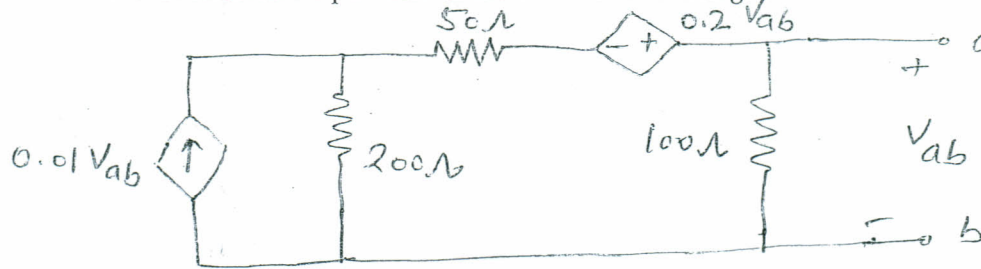


Q.3B Derive bandwidth for a series RLC circuit as a function of resonant frequency.

05

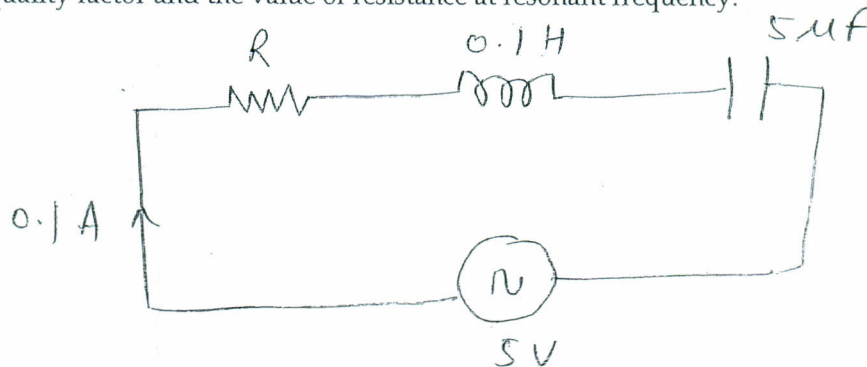
Q.4A Find the Thevenin's and norton's equivalent of the circuit shown in fig.

05



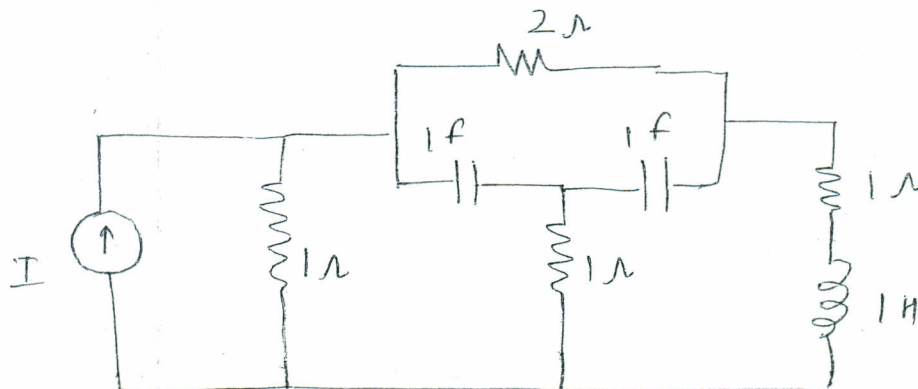
Q.4B In the circuit shown in fig., determine the frequency at which the circuit resonates, the bandwidth, quality factor and the value of resistance at resonant frequency.

05



Q.5A For the circuit shown in fig., (a) draw its graph (b) draw its tree (c) write the fundamental cutset matrix.

05

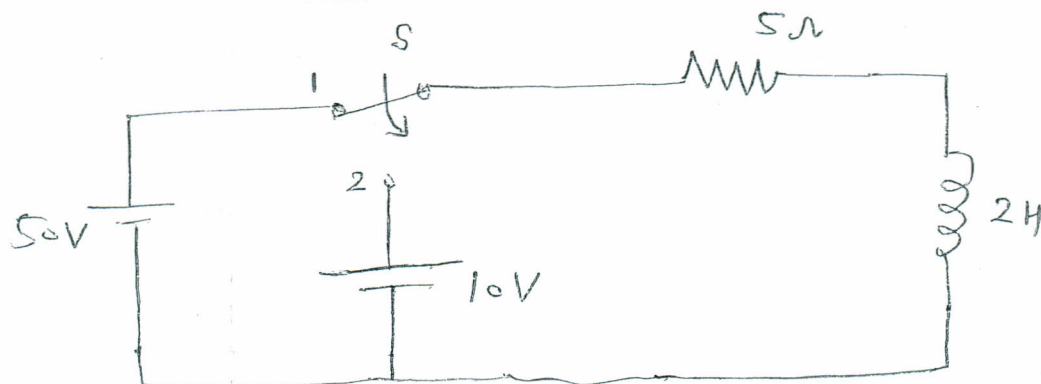


Q.5B State and prove tellegen's theorem with the help of a suitable example.

05

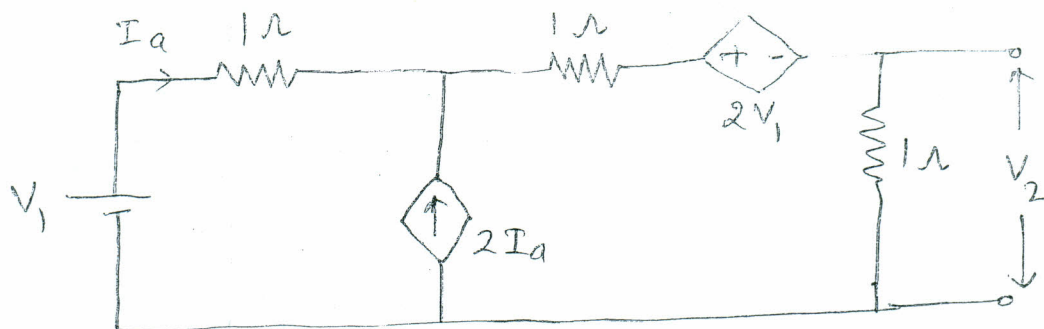
Q.6A In the circuit shown in figure, switch S is in position 1 for a long time and brought to position 2 at time $t=0$. Determine the circuit current.

05



Q.6B For network shown in fig. compute $G_{21}(s) = V_2(s)/V_1(s)$

05



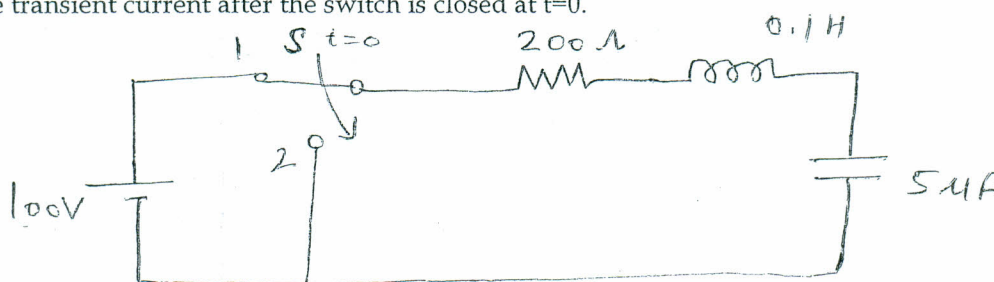
OR

Q.6B What is mutual inductance? Derive an expression for the mutual inductance between two magnetically coupled coils having self-inductances L_1 and L_2 respectively.

05

Q.7A Find the transient current after the switch is closed at $t=0$.

05



Q.7B Define Positive real function and write its properties.

05

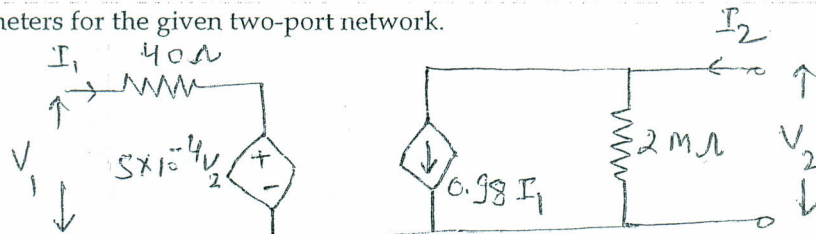
OR

Q.7B Obtain the equivalent parameters, when two 2-port networks N_1 & N_2 are connected in series and parallel configurations.

05

Q.8 Find the y-parameters for the given two-port network.

10



Q.9A Realise Foster forms (I & II) of the given LC function.

10

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

Q.9B Obtain the cauer forms of the RC impedance function.

10

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

OR

Q.9B Realise following RL impedance function in Foster-I and foster-II forms.

10

$$Z(s) = \frac{2(s+1)(s+3)}{(s+2)(s+6)}$$