

B. Tech EE (Semester – 3rd)
ELECTRICAL CIRCUIT ANALYSIS
Subject Code: BELES1301
Paper ID: [18111510]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

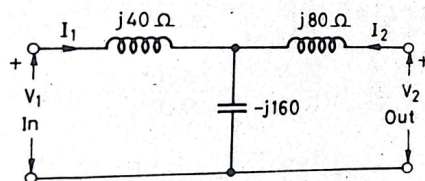
Q1. Attempt the following:

- a. A shifted unit step function is expressed as $f(t)=u(t-a)$. Obtain its Laplace transform.
- b. What is the need of interconnection of two-port networks?
- c. What does the time constant indicate?
- d. How effective value is estimated in electrical circuits?
- e. What is an engineering application of maximum power transfer theorem?
- f. Define the transfer function.
- g. What is the difference between steady state and transient state response?
- h. How 1-port network is different from 2-port network?
- i. Differentiate between nodal and mesh analysis.
- j. Draw the phasor diagram for inductive and capacitive load.

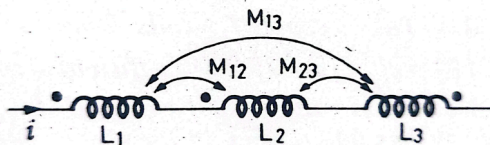
Section – B

(5 marks each)

- Q2. A $5\mu\text{F}$ condenser is connected in series with a coil having inductance of 50 mH. Determine the frequency of resonance, the resistance of the coil if a 50 V source operating at resonance frequency causes a circuit current of 10 mA. What is the Q factor of the coil?
- Q3. State and prove the Norton's theorem. Draw the electric circuits used.
- Q4. Find the open-circuit parameters of the two-port network shown in the figure below:



- Q5. Obtain the voltage and current equations for a series R - C circuit.
- Q6. Find the total inductance of the three series connected coupled coils as shown below:



Section – C

(10 marks each)

- Q7. In a series R - L circuit, the inductance being 20 mH, the impedance is $17.85\ \Omega$. The angle of lag of the input current from the applied voltage being 63.5° . Find the values of angular frequency and the resistance of the circuit.

$$P(s) = \frac{2s}{(s+2)(s^2+2s+2)}$$

- Q8. a) A network function is given by $P(s) = \frac{2s}{(s+2)(s^2+2s+2)}$. Obtain the pole-zero diagram.
b) Draw the phasor diagram of an ideal transformer.
- Q9. Write a short note on:
a) Mutually coupled circuits

b) Dual networks