3E1614

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# 3E1614

## B.Tech. III Semester (Main/Back) Examination, Dec. - 2016
## Applied Elect. & Inst. Engg.
## 3AI3 Circuit Analysis & Synthesis
## EC, EI, EX, AI, BM

**Time : 3 Hours** **Maximum Marks : 80**

**Min. Passing Marks : 26**

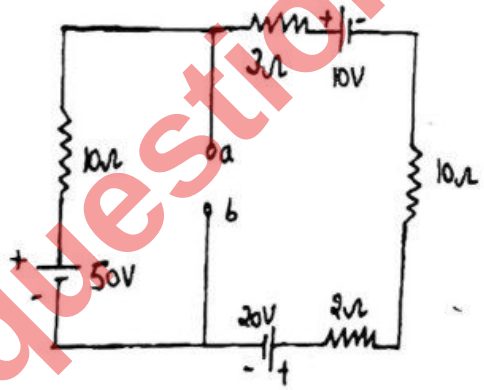
***Instructions to Candidates:***

*Attempt any **five** questions, selecting one question from **each unit**. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

**Unit - I**

**1.** a) State and explain Thevenin's theorem with the help of suitable example. **(8)**

b) Using superposition theorem, find the current through a link is to be connected between terminals a-b. Assume the link resistance to be zero.

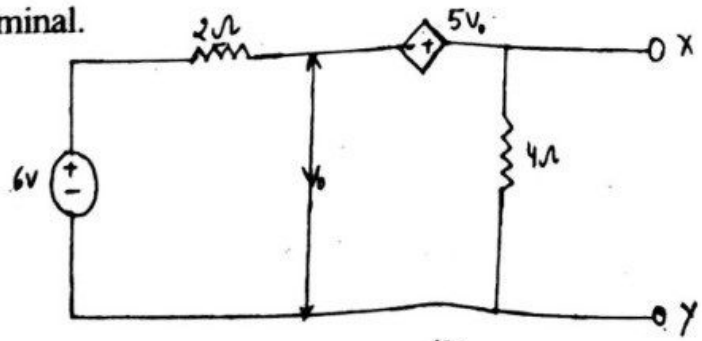



**(8)**

**OR**

**1.** a) State and prove maximum power transfer theorem. **(8)**

b) Find the Norton's equivalent of the circuit shown in figure at the left of X-Y terminal. **(8)**





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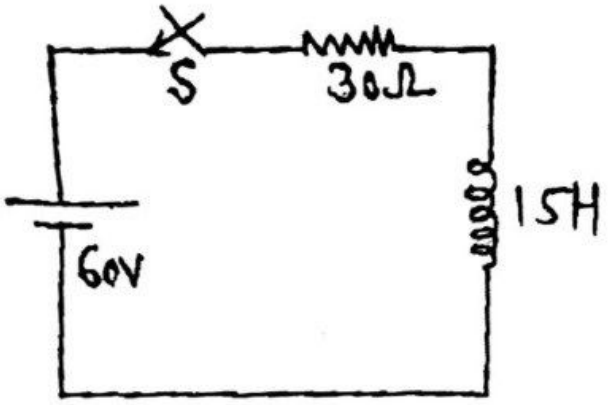
## Unit - II

**2.** a) A series RL circuit with $R = 30\Omega$ and L = 15 H has a constant voltage $V = 60V$ applied at t = 0 as shown in fig. Determine the current i, the voltage across resistor and the voltage across the inductor.




**(8)**

b) Explain different types of functions used in transient analysis. **(8)**

**OR**

**2.** a) Find the transient responses of :

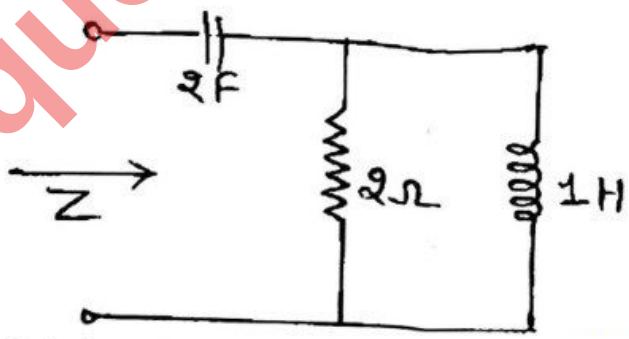
a) Series R-L

b) Series R-C circuit having sinusoidal excitation **(8)**

b) The step voltage applied to a series R-L circuit is 36 V with $R = 15\Omega$. Determine the value of inductance L required to make the current of 1.0 A at 250 $\mu$ sec. Assume the initial current is zero. **(8)**

## Unit - III

**3.** a) Find Z(s) for the following network. **(8)**




b) Explain the relationship between pole position and stability. **(8)**

**OR**

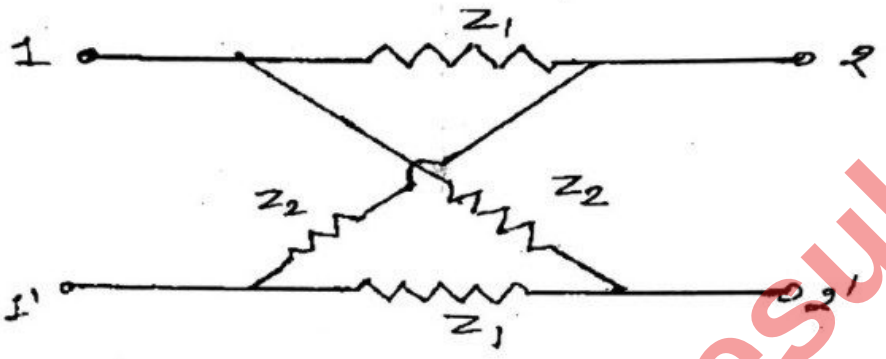
**3.** a) Obtain the pale zero diagram of the given function and obtain the time domain response.

$$I(S) = \frac{2S}{(S+1)(S^2+2S+4)}$$ **(8)**

b) Check whether the following polynomial $P(S) = S^4 + S^3 + 2S^2 + 2S + 3$ is stable or not comment on your findings. **(8)**

## Unit - IV

**4.** a) For the lattice two port network of fig. Find the image impedance and the image transfer constant.



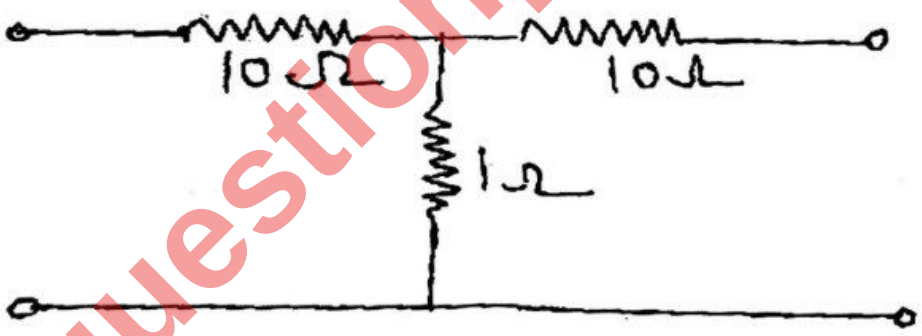

**(8)**

b) Derive Z-parameters in terms of hybrid parameters. **(8)**

**OR**

**4.** a) Derive the condition for reciprocity and symmetry in case of ABCD parameters. **(8)**

b) Two identical T section, as one shown in fig. are connected in cascade. Determine the Z-parameters of the combination.




**(8)**

## Unit - V

**5.** An impedance is given by $Z(s) = \frac{8(S^2+1)(S^2+3)}{5(S^2+2)(S^2+4)}$ Realise the network in Foster - I, II and cauer - I, II form. **(16)**

**OR**

**5.** Realise the function $z(s) = \frac{s(s^2+4)}{2(s^2+1)(s^2+9)}$ in both the cauer and foster forms of LC networks. **(16)**