2024 JMTO

ABV- Indian Institute of Information Technology & Management, Gwalior
Semester-I

Minor Examination

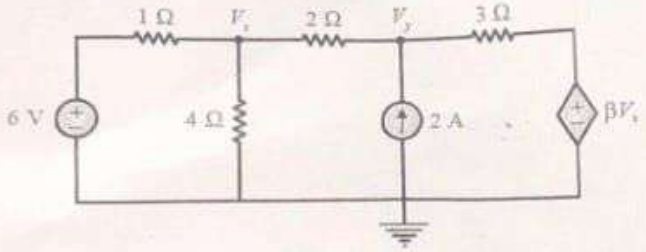
Course Title: Fundamentals of Electrical and Electronics Engineering (EE101)

Duration: 2:00 Hrs

MM: 25

Note:
1. All parts of a question should be answered consecutively.
2. All the questions are compulsory.

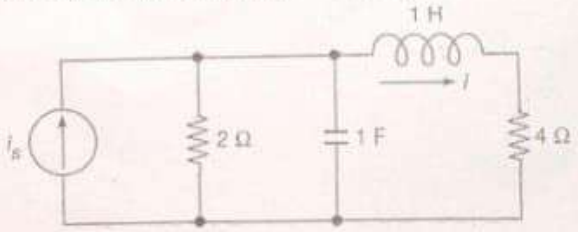
Q1. (a) Briefly explain nodal and mesh analysis with an example. In the given circuit, for voltage V_y to be zero, find the value of β.



(b) A benchtop dc power supply acts as an ideal 4 A current source as long as its terminal voltage is below 10 V. Beyond this point, it begins to behave as an ideal 10 V voltage source for all load currents going down to 0 A, When connected to an ideal rheostat, find the load resistance value at which maximum power is transferred and the corresponding load voltage and current.

(c) Briefly explain with an example for necessary condition for a circuit to be called linear.

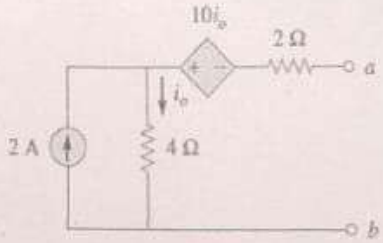
(d) With an example explain Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL), and hence find i_s, in the below circuit, given $i = \sin 2t$.



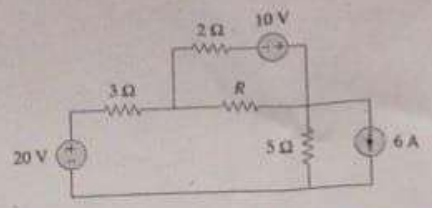
[2+1.5+1.5+2]

Q.2. (a) Define Norton's theorem with a circuit example. Hence also mention the method of finding Norton's circuit elements.

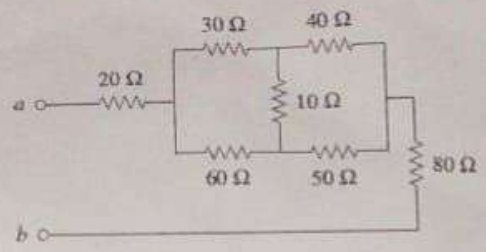
(b) Determine the Norton equivalent at terminals a-b for the circuit



(c) Find the maximum power that can be delivered to the resistor R in the following circuit.

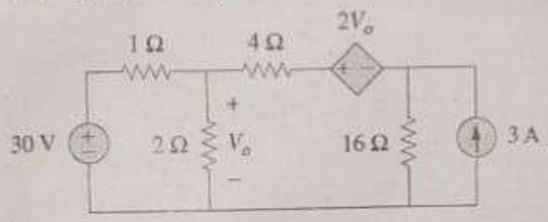


(d) Find equivalent resistance R_{eq} in the circuit shown below.

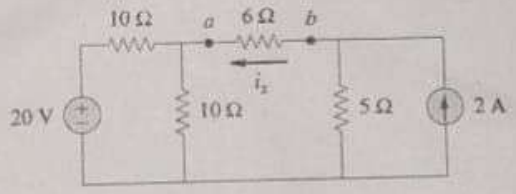


[2+2+2+2]

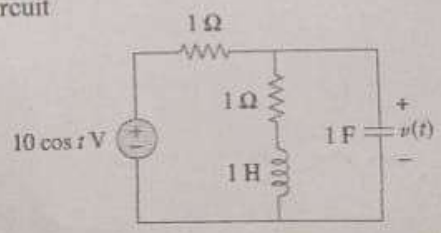
3. (a) Using nodal analysis, find V_0 in the circuit shown below



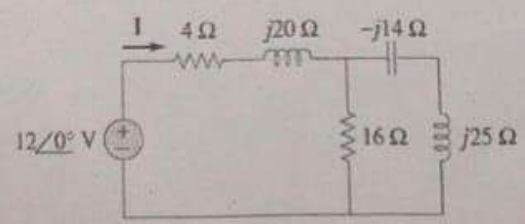
(b) With a neat circuit diagram, briefly explain and prove Thevenin theorem. Hence also find Thevenin equivalent looking into terminals a and b for the circuit shown below. Also find i_x.



(c) Find $v(t)$ in the following circuit



(d) For the circuit shown in figure below, find Z_{eq} and use that to find current I. Let ω=10 rad/s.



[2+3+3+2]