Indian Institute of Information Technology Vadodara

Mid Semester Examination (Autumn, 2021-22)

Course: EC100 Basic Electronic Circuits

Session-II: Remote (Scan & Upload) Examination

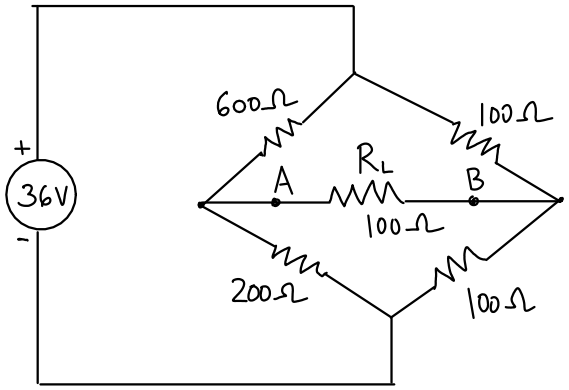
Full Marks: 40 **Date:10/02/2022**

Time: 11:30 AM - 12:10 PM + 10 min. (scan & email)

Instructions:

1. *Attempt **ALL** the questions.*
2. *All the pages in the answer Notebook should be numbered sequentially.*
3. *On each page, the top margin should contain your Institute ID, Name and Signature.*
4. *Pages without personal details and page number will not be evaluated.*
5. *Answer each question sequentially beginning on a new page.*
6. *Scan the pages and save in pdf format with file name: Your Institute ID.pdf. (For example: 202151023.pdf)*
7. *Email the file as an attachment.*
8. *Preserve the Notebook for submission.*

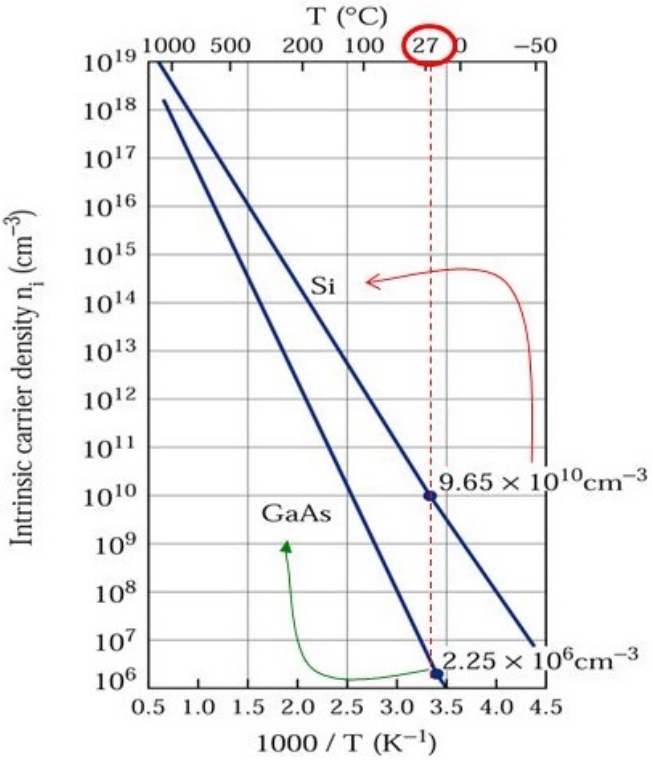
Q1. You have been provided with an unbalanced bridge circuit as shown below. [5+5]



(a) Apply Thevenin's theorem across the terminals A and B and draw the Thevenin equivalent circuit mentioning the value of Thevenin voltage and resistance.

(b) What would be the value of load current I_L and load voltage V_L ?

Q2. The temperature dependent intrinsic carrier density of the two semiconductors: Silicon and GaAs is depicted below in the semi-log graph. Analysing the data of the graph, estimate and compare their band-gap energy. [10]



Q3. Let you are a hardware engineer in a start-up company that designs, tests, manufactures, and markets various electronic instruments including *DC-Power* supplies. [12 + 4 + 4]

(a) As a first assignment, develop and test a basic unregulated power supply using the knowledge that you have acquired so far. The power supply must meet following specifications:

- ○ Input voltage: 220 V rms @50 Hz
- ○ Output voltage: 12 V DC ± 10%

(b) Now, the unregulated 12 V dc power supply is to be upgraded to a regulated power supply with a fixed output voltage of 12 V. Propose a circuit design to meet this requirement.

(c) Is it possible to attach a power indicator in your circuit? Name the device and show it in the circuit diagram.