

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

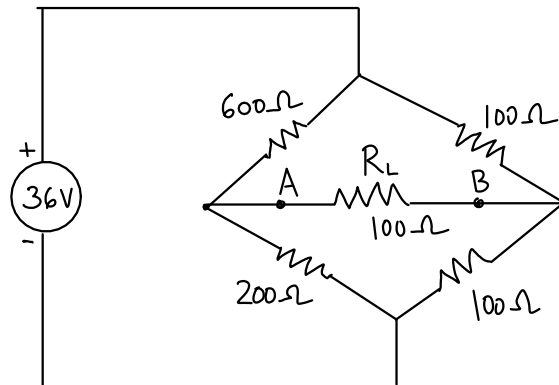
Time: 11:30 AM - 12:10 PM + 10 min. (scan & email)

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.
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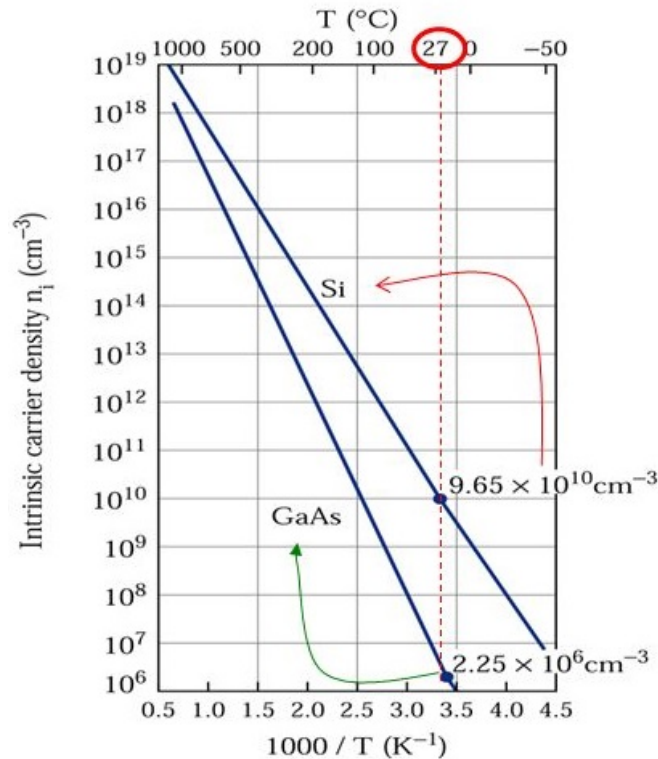
Q1. You have been provided with an unbalanced bridge circuit as shown below.

[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 \pm 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.
