

Quiz - 1

ECE214 - Integrated Electronics

- **INSTRUCTIONS:**

Total Marks = 100

Time Duration = 60 minutes for solving + 10 minutes uploading

1. The duration of the exam is 60 mins, and 10 mins for scanning and uploading the solutions. No further extension of time will be given regarding this. **Any late submission will be awarded 0 marks.**
2. This paper contains four questions, with their respective subparts. Some questions may also utilize the elementary level understanding of your previous courses.
3. The question paper will be uploaded in google classroom. Do not forget to turn it in. Solutions submitted by any other means (email etc.) won't be considered for evaluation.
4. Students are required to switch on their cameras and mute themselves. Make sure you are sitting in a well-lit room so that we are able to see your faces clearly. **If you are not clearly visible, you will be awarded 0 marks.**
5. The answers should be in your own handwriting and submission should be in PDF format only. No other mode of submissions will be accepted.
6. Write any assumption clearly, if any. Needless to say, only reasonable assumptions will be considered if any ambiguity is found in the question.
7. During the exam, if you have any queries, write them in the meet chatbox. It will be taken into notice by us. Don't unnecessarily unmute your mic for it creates a disturbance to others.
8. Calculators are NOT allowed during exam time. ONLY use pen and paper for writing the exam.
9. Students need to be present and visible for the whole exam duration (till the end of solution uploading time) even if they upload the solution before time.
10. **NAMING CONVENTION** - <Name>_<Roll No.>_Quiz1.pdf
11. Show your calculations and justifications in each question.

Q1. In the given circuit in Fig. 1, for the transistor Q, base to emitter drop ($V_{BE(ON)}$) is 0.7 V, $V_{ce(sat)} = 0.2$ V and zener breakdown voltage is given to be 4.8 V.

- Calculate the value for the dc current gain β for Q? Take $R_c = 330$ Ohm. [10 Marks]
- What is the range of R_c for which Q1 will remain in active region. [15 Marks]

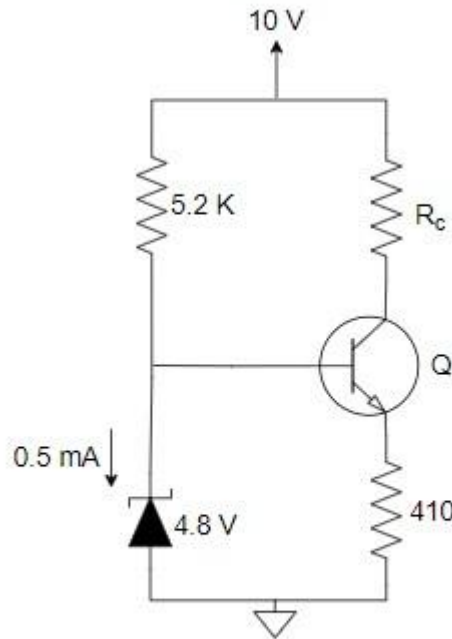


Fig. 1

Q2. In the circuit shown in Fig. 2, diode is ideal with a cut-in voltage of 0.7 V.

- Find the magnitude of current I_2 . [10 Marks]
- If 2 K ohm arm is removed from the circuit, find the bias point for D1. [15 Marks]

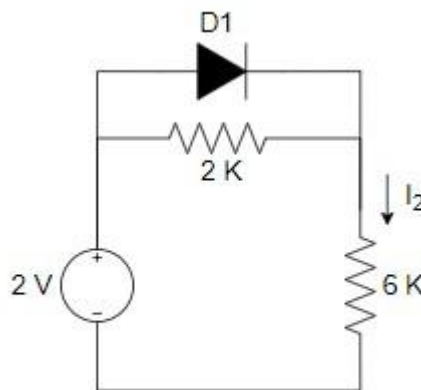


Fig. 2

Q3. In the circuit shown in Fig. 3, breakdown voltage of the zener is 5V, β of the NPN transistor is 100. Assume that $V_{BE(ON)}$ is 0.7V

- Find the current and voltage at each terminal of the transistor. [15 marks]
- Can you make an NPN-BJT by connecting two PN junctions together from their P-terminal and using the N-terminals as Collector and Emitter (Refer Fig. 4). Give a detailed explanation.

[10 Marks]

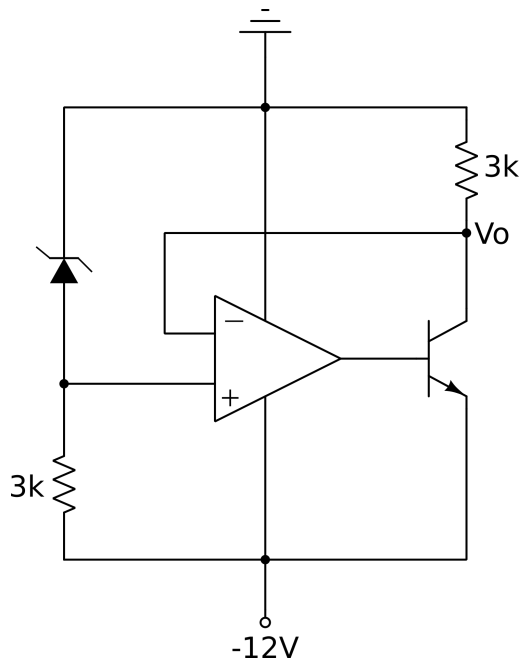


Fig. 3

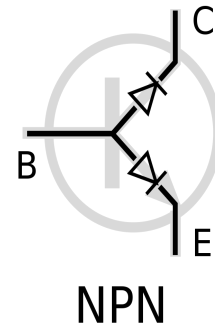


Fig. 4

Q4. For the circuit shown in Fig. 5, diode is ideal with a negligible cut-in voltage.

- Find the relation between V_o and V_i . Note that V_i can be both +ve and -ve. [15 Marks]
- Which circuit you have studied so far mimics the above circuit's behavior. Is there any advantage of the below circuit over the other circuit? [10 Marks]

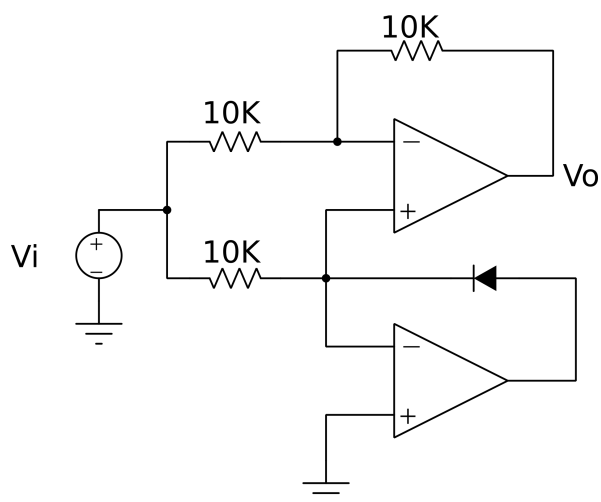


Fig. 5