

International Islamic University Chittagong

Department of Electrical and Electronic Engineering

Final Assignment Test Autumn-2020 Program: B.Sc. Engg. (EEE)
 Course Code: **EEE-3607** Course Title: **Solid State Devices**
 Time: **5 hours** (Writing -4 hours 30 minutes + 30 minutes submission time) Full Marks: **50** (Written 30 + Viva/Viva-Quiz-20)

[Answer each of the questions from the followings; Figures in the right margin indicate full marks. Answer script must be submitted through online method within 5 hours from starting time. Also, write down the Q. Set on the front page of your answer script]

SET-C

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|--|-----|------|---|
| 1(a). Let us consider the forward drop of a p-n junction diode is 0.9 V, $V_f=0.6$ V and $V_r=0.7$ V. Draw the band diagram and physical structure of the p-n junction under forward bias, reverse bias and without bias condition. | CO2 | Ap | 3 |
| 1(b). Discuss the zener breakdown mechanism in brief. Do you think that the zener breakdown is a destructive phenomenon? | CO2 | E | 3 |
| 2(a). Draw the band diagram of a npn transistor where the EBJ is reverse bias and CBJ is forward bias. | CO3 | Ap | 3 |
| 2(b). How the name coupled diode model comes?
Explain the coupled diode model equivalent circuit diagram of a BJT in brief. | CO3 | U+E | 3 |
| 3(a). What is pinch of voltage V_p for a JFET? Is it an external parameter or an internal device parameter? How to specify V_p ? Is it possible to change it by changing voltage or current? | CO3 | U+Ap | 3 |
| 3(b). Distinguish between a JFET and MESFET. How performance can be improved in a HEMT? | CO3 | An | 3 |
| 4. Explain the operation of a p^+-n-p^+ MOSFET using the typical band structure. Do you think that a p-channel and an n-channel MOSFET both have same performance? Give suitable reason in favor of your opinion. | CO3 | E | 6 |
| 5(a). Why short circuit current increases proportionally with the light illumination whereas the open circuit voltage does not change significantly? Explain in brief. | CO3 | E | 3 |
| 5(b). A solar cell under an illumination of 800 Wm^{-2} has a short circuit current I_{sc} of 190 mA and open circuit voltage of 0.713 V. What are the short circuit current and open circuit voltage when the light intensity is 1200 Wm^{-2} ? | CO3 | Ap | 3 |
| 6. Viva/Viva-Quiz schedule will be announced in the Google Classroom | 20 | CO2 | |

Set will be determined by the last two digits of the student ID.

Set A: Even Even

Set B: Even Odd

Set C: Odd Odd

Set D: Odd Even