



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (ECE-OLD)/SEM-4/EC-405/2013
2013
MICROELECTRONICS &
OPTO-ELECTRONIC DEVICES

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$
- i) When a transistor is used as switch its operation is confined to
 - a) cut-off region
 - b) saturation region
 - c) active region
 - d) both (a) & (b).
 - ii) In a state of saturation a MOSFET acts as
 - a) a close switch
 - b) an open switch
 - c) an amplifier
 - d) an inductor.
 - iii) Electron affinity depends on
 - a) semiconductor material
 - b) doping of the semiconductor
 - c) applied potential
 - d) none of these.



- iv) Charge coupled devices are used to
- a) store the charge
 - b) transfer the charge
 - c) both (a) & (b)
 - d) none of these.
- v) Which of the following pairs are suitable for making a heterojunction ?
- a) Si & Ge
 - b) Si & GaAs
 - c) GaAs & AlAs
 - d) GaAs & GaAlAs.
- vi) Metal n -type semiconductor form ohmic contact if
- a) $\varphi_m > \varphi_{sn}$
 - b) $\varphi_m = \varphi_{sn}$
 - c) $\varphi_m < \varphi_{sn}$
 - d) none of these.
- vii) Stimulated emission is observed in
- a) LED
 - b) LASER
 - c) Solar cell
 - d) Photodiode.
- viii) Bulk micromachining makes micromechanical devices by etching deeply into
- a) Germanium wafer
 - b) Carbon wafer
 - c) Silicon wafer
 - d) Gallium wafer.
- ix) In Schottky barrier diode, the current mechanism is due to
- a) minority carrier
 - b) majority carrier
 - c) both (a) & (b)
 - d) none of these.
- x) Bilateral switch is
- a) DIAC
 - b) IGBT
 - c) Thyristor
 - d) None of these.
- xi) The condition, where the majority carrier concentration is greater near the Si-SiO₂ interface compared to the bulk in the MOSFET is called
- a) accumulation
 - b) depletion
 - c) inversion
 - d) none of these.

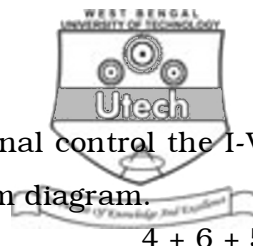
- GROUP – B**

Answer any *three* of the following. $3 \times 5 = 15$

- ### GROUP – C

Answer any *three* of the following. $3 \times 15 = 45$

- [Turn over



- c) How does the presence of third terminal control the I-V response of SCR ? Explain with system diagram. 4 + 6 + 5
8. a) Explain how we can design a high electron mobility system using heterojunction.
- b) What are the advantages of high electron mobility system ?
- c) What do you mean Ballistic transport ? 6 + 4 + 5
9. a) What are Bulk micromachining and surface micromachining ?
- b) Describe each with schematic diagrams. 5 + 10
10. a) What do you mean by luminescence process ?
- b) How does an LED work ?
- c) Show the construction of typical LED.
- d) What are the applications of LED ? 3 + 5 + 5 + 2
11. Write short notes on any *three* of the following : 3 × 5
- a) MEMS pressure sensor
- b) OEIC
- c) Laser diode
- d) Solar cell
- e) MOSFET scaling.
-