WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 2nd Semester Examination, 2022

ELSACOR03T- ELECTRONICS (CC3)

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

GROUP-A

1. Answer any ***five*** questions from the following: 2×5 = 10

   (a) What is a primitive cell?

   (b) Write the significance of "Law of mass action".

   (c) Why crystalline solids are isotropic in nature while amorphous ones are not?

   (d) What are the effects of the depletion capacitance at a *p-n* junction?

   (e) What is the base transport factor of a transistor?

   (f) Distinguish between Enhancement type and Depletion type MOSFETs.

   (g) Why MOSFETs are also called IGFET and MISFET?

   (h) How power electronic devices differ from their non-power application devices structurally?

GROUP-B

Answer any *six* questions from the following 5×6 = 30

2. (a) Copper (Cu) has FCC lattice structure having atomic radius 1.278Å. Find its density. 3+2

   (b) What is the utility of Miller indices?

3. What is 'Hall effect'? Explain the phenomenon. 5

4. (a) What is space-charge region in a *p-n* junction? Draw the energy level diagram and point out the space charge region at the thermal equilibrium. (1+2)+2

   (b) Explain Avalanche breakdown mechanism in a *p-n* junction.

5. What is potential barrier? Find the expression of potential barrier for a *p-n* junction at equilibrium condition. 1+4

6. (a) What do you mean by 'Base-width Modulation' and 'Punch-through' effect in bipolar junction transistor? $(1\frac{1}{2}+1\frac{1}{2})$

   (b) A silicon n-p-n transistor with $\alpha = 0.995$ and $I_{CO} = 15\,\text{nA}$, operates in the CE configuration. What is the collector current for a base current of 20 μA? +2

7. Sketch a neat diagram of a n-channel depletion type MOSFET structure, and explain its operation. 5

8. Draw the Emitter follower circuit with a n-p-n transistor. Explain the working of the circuit. 5

9. Explain the structure of an Unijunction Transistor with a neat diagram. Write two applications of UJT. 4+1

10. (a) What are the differences between Ohmic and Rectifying contacts? 3+2

    (b) What is a linearly graded junction?

11. (a) What are the basic differences between JFET and MOSFET? 2+2+1

    (b) What is meant by 'pinch-off' of a JFET?

    (c) Why complete 'pinch-off' is not possible?

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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