Faculty of Science

B.Sc (Physics) III-Year, CBCS–VI Semester Backlog Examinations –Jan, 2023

PAPER: Electronics

Time: 3 Hours   Max Marks: 80

Section-A

I. Answer any *eight* of the following questions   (8x4=32 Marks)

1. Distinguish between Intrinsic and Extrinsic Semiconductors.
2. Write a short note on Bridge rectifier.
3. What is transistor? Explain the parts of transistor.
4. Define α. Show that it is always less than 1.
5. Briefly explain the phase shift oscillator.
6. Explain frequency response of RC – coupled amplifier.
7. Write a short note on Photodiode.
8. What is FET? Explain the types of FET.
9. Explain how SCR used as a switch.
10. Convert the binary number 101111.0111 into the decimal system.
11. Draw NOR, X-OR gate symbols and write their truth tables.
12. Explain the Universal Gates concept.

Section-B

II. Answer the following questions   (4x12=48 Marks)

13.(a) Explain the Band theory of Solids. Distinguish between Conductor, Semiconductor and Insulator.

(OR)

(b) What is zener diode? Explain zener diode as voltage regulator.

14.(a) What is transistor? Explain the principle and working of Common emitter Transistor amplifier.

(OR)

(b) Explain the concept of General Theory of Feedback. What is Barkhausen's criteria.

15.(a) Explain the construction and working of UJT as relaxation oscillator. Derive its frequency formula.

(OR)

(b) Describe the Shockley diode's construction and characteristics.

16.(a) Explain Hexadecimal number system. Explain how Hexadecimal Number is converted to Decimal and Decimal to Hexadecimal.

(OR)

(b) State and prove DeMorgan's Laws.

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Faculty of Science
B.Sc (Physics) III-Year, CBCS –VI Semester
Regular Examinations –June/July 2022
PAPER-E1: Electronics

Time: 3 Hours   Max Marks: 80

Section-A

I. Answer any *eight* of the following   (8x4=32 Marks)

1. What are p-type and n-type semiconductors?

2. Differentiate between half wave rectifier and full wave rectifier.

3. Draw the circuit diagram of bridge rectifier and explain its working.

4. Define α, β of a transistor and obtain relation between them.

5. Explain how a transistor works as an amplifier.

6. What is feedback? What are different types of feedback? Explain Barkhausen criteria?

7. Explain the functioning of solar cell?

8. Explain the functioning of a FET as an amplifier?

9. Explain the working of a Silicon Controlled Rectifier (SCR)?

10. Convert the binary number into decimal number : $1001_{(2)}$

11. Construct OR gate using NAND gate?

12. Draw the circuit symbol of EX-OR gate and write its truth table?

Section-B

II. Answer the following questions   (4x12=48 Marks)

13.(a) Derive equation of continuity and explain its physical significance?

(OR)

(b) What is Zener diode? Describe its V-I characteristics and explain its function as voltage regulator?

14. (a) Draw the circuit diagram of R-C coupled amplifier and explain its frequency response?

(OR)

(b) Draw the circuit diagram of phase shift oscillator and obtain the expression for frequency of oscillation

15. (a) What is a photo diode? Explain its construction and characteristics?

(OR)

(b) Explain the construction and working of a UJT.

16. (a) Draw the circuit symbols of OR, AND, NOR, NAND gates and write their truth tables.

(OR)

(b) State and prove De Morgan's laws.

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Faculty of Science

B.Sc(Physics) III-Year, CBCS–VI Semester Regular Examinations –June, 2023

PAPER: Electronics

Time: 3 Hours   Max Marks: 80

Section-A

I. Answer any *eight* of the following questions   (8x4=32 Marks)
  1. Define intrinsic, extrinsic, n- type and p-type semiconductors?
  2. Explain Fermi energy level in semiconductors?
  3. Explain the functioning of half wave rectifier?
  4. Explain the working of n-p-n transistor?
  5. Define α and β of a transistor and derive relation between them?
  6. What is feedback? Explain different types of feedback?
  7. Explain about Opto-couplers?
  8. Write a short note on solar cell?
  9. Describe construction and working of SCR?
  10. Convert $15_{(10)}$ into binary number system?
  11. Add these binary numbers using 1's compliment method : $1111_{(2)}$, $0101_{(2)}$
  12. Construct OR gate using NAND gate?

Section-B

II. Answer the following questions   (4x12=48 Marks)
  13.(a) Derive equation of continuity and explain its physical significance?

                                   (OR)

  (b) Describe the V- I characteristics of a Zener diode? Explain the working of a Zener diode as a voltage regulator.

  14.(a) Explain the construction and working of a n-p-n transistor?

                                   (OR)

  (b) Draw the circuit diagram of a phase shift oscillator and obtain the expression for its frequency of oscillation.

  15.(a) Explain the construction and characteristics of a Photo diode?

                                   (OR)

  (b) Explain the construction and working of a UJT?

  16.(a) Construct OR, AND gates using NAND gate and write their truth tables?

                                   (OR)

  (b) State and prove De Morgan's laws.

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Faculty of Science
B.Sc (Physics) III-Year, CBCS –VI Semester Regular Examinations –June, 2023
PAPER: Nano Science (Optional)

Time: 3 Hours   Max Marks: 80

Section-A

I. Answer any *eight* of the following questions   (8x4=32 Marks)

1. Define nanoscience and nanotechnology.
2. What is quantum dot?
3. Differentiate between nanowire and nanotube.
4. What is bottom-up approach?
5. Explain MBE growth of quantum dots.
6. How the structure of nanomaterials is determined by x-rays diffraction.
7. Mention the properties of core-shell nano structures.
8. What is Coulomb blockade effect?
9. What are deep level and surface defects in nano structures?
10. Write applications of nanotechnology.
11. Why storage of nanomaterials is a challenge?
12. Write a short note on CNT based transistors.

Section-B

II. Answer the following questions   (4x12=48Marks)

13.(a) Justify that surface area to volume ratio increases while we go from bulk to nanoscale with an illustration.

(OR)

(b) Describe the composition of fullerene C_{60} structure and discuss its applications.

14.(a) Explain the processing of ball milling.

(OR)

(b) Compare SEM and TEM.

15.(a) Explain the concept of dielectric constant of nanostructures.

(OR)

(b) Describe tunneling and hopping conductivity.

16.(a) Discuss the biological tagging and labeling using quantum dots.

(OR)

(b) What is MEMS? Discuss its applications in various fields.

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