2024/TDC (CBCS)/EVEN/SEM/
PHSDSE–602T/098

TDC (CBCS) Even Semester Exam., 2024

PHYSICS

(6th Semester)

Course No. : PHSDSE–602T

(Physics of Devices and Communication)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

1. Answer any *four* of the following questions : 1×4=4

(a) What is the order of input resistance of JFET?

(b) Write the main characteristic of MOSFETs.

(c) Draw the small signal equivalent circuit of JFET.

(d) Write about the principle of operation of a tunnel diode.

(e) Write one important application of UJT.

2. Answer any *one* of the following questions : 2

(a) Describe metal-semiconductor junction.

(b) Describe the operation of a UJT with proper diagram.

3. Answer any *one* of the following questions : 8

(a) (i) Write briefly about MOSFET. 2

(ii) With the help of a circuit diagram, explain the operation and drain characteristics of N-channel depletion type MOSFET. 6

(b) (i) With the circuit diagram, explain the small signal equivalent circuit of UJT. 3

(ii) Write a short note on MOSFETs and the frequency limits. 5

UNIT—II

4. Answer any *four* of the following questions : 1×4=4

(a) Give two examples of passive filter circuit elements.

(b) Mention the uses of IC regulators.

(c) Draw the circuit diagram of a transistorised monostable multivibrator.

(d) Write the basic principle of phase detectors operation.

(e) What is a varactor?

5. Answer any *one* of the following questions : 2

(a) What do you understand by line and load regulation?

(b) Explain the working of a voltage-controlled oscillator with a circuit diagram.

6. Answer any *one* of the following questions : 8

(a) (i) Draw the circuit diagram of an active band-pass filter, and explain its working. 4

(ii) Draw the circuit diagram of an astable multivibrator, and explain its operation. 4

(b) (i) Draw the block diagram of a power supply, and explain the function of each unit. 4

(ii) With a neat diagram, explain the working and principle as a short circuit protector. 4

UNIT—III

7. Answer any *four* of the following questions : 1×4=4

(a) Mention some properties of electronic grade silicon.

(b) What are different types of defects in the crystal lattice?

(c) How is oxide layer formed during IC fabrication?

(d) What do you mean by electron lithography?

(e) What do you mean by masking?

8. Answer any *one* of the following questions : 2

(a) Describe briefly the basic process flow for IC fabrication.

(b) What is metalization technique? Explain briefly.

9. Answer any *one* of the following questions : 8

(a) *(i)* Explain positive and negative masking. 2

(ii) Describe the various steps involved in optical lithography. 4

(iii) What is the principle of lift-off technique? 2

(b) *(i)* Describe the techniques of oxidation for Si. 6

(ii) What do you understand by anisotropic etching? 2

UNIT—IV

10. Answer any *four* of the following questions : 1×4=4

(a) Write the full form of USB.

(b) What do you mean by parallel communication?

(c) Why is USB preferred and commonly used?

(d) What is the process of handshaking?

(e) Write about GPIB signal lines.

11. Answer any *one* of the following questions : 2

(a) What are various USB standards?

(b) How is GPIB implemented on a PC?

12. Answer any *one* of the following questions : 8

(a) *(i)* Write a short note on the elements of USB transfers. 4

(ii) How are data sent through COM port? Describe. 4

(b) (i) Write a short note on GPIB. 4

(ii) Describe briefly about GPIB signals and lines. 4

UNIT—V

13. Answer any *four* of the following questions : 1×4=4

(a) Why is modulation important in communication system?

(b) Write the expression for modulation index.

(c) Draw the waveform of a typical frequency modulated wave.

(d) Why are side bands eliminated in commercial broadcasting systems?

(e) Draw a simple block diagram of the electronic communication system.

14. Answer any *one* of the following questions : 2

(a) Draw and analyse an amplitude modulated wave.

(b) Explain phase modulation.

15. Answer any *one* of the following questions : 8

(a) Explain and obtain the expression for an amplitude modulated wave. Discuss about side band frequencies.

(b) What do you mean by demodulation? With a neat circuit diagram, explain the working of a diode detector. Why is demodulation necessary?

★ ★ ★