

**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.

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- (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.

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- (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

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( Turn Over )

## 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

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- (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.

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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?

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