

20. Explain the working of a Photoconductor in semiconductor devices.

**SECTION C – (5 x 10 = 50 marks)**

**ANSWER ALL QUESTIONS**

21. A Analyze the forward and reverse biasing of Zener diode.  
OR  
B Examine the working principles and applications of Varactor diode.
22. A Analyze the structure and characteristics of a JFET.  
OR  
B For a certain D-MOSFET,  $I_{DSS} = 10 \text{ mA}$  and  $V_{GS(off)} = -8\text{V}$ . i) is this an n-channel or a p-channel?, ii) Calculate  $I_D$  at  $V_{GS} = -3\text{V}$  and iii) Calculate  $I_D$  at  $V_{GS} = +3\text{V}$
23. A Sketch the V-I characteristics of UJT and write its advantages in power control devices.  
OR  
B Construct the DIAC circuit in power controlled devices and write its working principles and applications.
24. A Simplify the I-V characteristics of tunnel diode and write its importance electronic devices.  
OR  
B Examine the characteristics of an IMPATT diode.
25. A Explain in brief the quantum efficiency of photo diodes.  
OR  
B Elaborate the concepts of hetero-junction and avalanche photodiodes.

Reg. No.									
----------	--	--	--	--	--	--	--	--	--

**END SEMESTER EXAMINATION NOV/DEC-2023**

**First Semester**

**M.Sc PHYSICS**

**PROFESSIONAL COMPETENCY COURSE – SEMICONDUCTOR DEVICES**

**Time: Three Hours**

**Maximum: 75 marks**

**SECTION A – (15 x 1 = 15 marks)**

**ANSWER ALL QUESTIONS**

- A semiconductor diode has forward resistance of the order  
A  $k\Omega$  B  $\Omega$   
C  $M\Omega$  D  $G\Omega$
- A Zener diode is used as  
A An amplifier B A voltage regulator  
C A rectifier D A multivibrator
- The forward voltage drop across a silicon diode is about  
A 2.5 V B 3 V  
C 10 V D 0.7 V
- A JFET has three terminals, namely  
A Cathode, anode, grid B Emitter, base, collector  
C Source, gate, drain D Source, gate, current

5. A MOSFET uses the electric field of a \_\_\_\_\_ to control the channel current.  
 A Capacitor                      B Battery  
 C Generator                      D Diode
6. An n-channel D-MOSFET with a positive  $V_{GS}$  is operating in  
 A The depletion mode      B The enhancement mode  
 C Cut-off                      D Saturation
7. The control element in an SCR is  
 A Cathode                      B Anode  
 C Anode supply              D Gate
8. The V-I characteristics for a TRIAC in the first and third quadrants are essentially identical to those of \_\_\_\_\_ in the first quadrant.  
 A transistor                      B UJT  
 C SCR                          D FET
9. A UJT is sometimes called \_\_\_\_\_ diode.  
 A Low resistance              B High resistance  
 C Single-base                  D Double-based
10. The IMPATT diode can generate the highest continuous wave at above.  
 A 30 MHz                      B 30 GHz  
 C 10 kHz                      D 10 GHz
11. Which of the following diode exhibits negative resistance in its

I-V characteristics?

- A Schottky diode              B PIN diode  
 C Tunnel diode                  D IMPATT diode
12. The most powerful solid-state sources of microwave power used in  
 A Schottky diode              B PIN diode  
 C Tunnel diode                  D IMPATT diode
13. The wavelength of the photon energy is  
 A  $1.24/hv \mu\text{m}$                   B  $1.24/v \mu\text{m}$   
 C  $1.24/h \mu\text{m}$                   D  $1.24/hv \text{nm}$
14. A modulation frequency of 2 GHz for the optical depletion layer thickness of silicon is about  
 A  $10 \mu\text{m}$                       B  $25 \mu\text{m}$   
 C  $50 \mu\text{m}$                       D  $100 \mu\text{m}$
15. \_\_\_\_\_ current is the leakage current that flows through a photodiode with no input used in as light detectors.  
 A Leakage                      B Dark  
 C Saturation                      D Detection
- SECTION B – (2 x 5 = 10 marks)**  
**ANSWER ANY TWO QUESTIONS**
16. Summarize the important characteristics of PN junction diodes.  
 17. Show the working principles of a JFET.  
 18. Express the V-I characteristics of SCR.  
 19. Write down the construction and working principle of MISS diode.