

Roll No.

E-513

**M. Sc. (Second Semester)
EXAMINATION, May-June, 2021**

PHYSICS

Paper Third

**(Electronics and Photonic Devices
and Optical Modulators)**

Time : Three Hours] [Maximum Marks : 80

Note : Attempt all Sections as directed.

Section—A 1 each

(Objective/Multiple Choice Questions)

Note : Attempt all questions.

Choose the correct answer :

1. Unique behaviour exhibiting the SCR is :
 - (a) Continuous current
 - (b) Breakover voltage
 - (c) Establishes a voltage and current gradient
 - (d) Establishes a voltage gradient

2. The depletion region is created by :
 - (a) Ionization
 - (b) Diffusion
 - (c) Recombination
 - (d) All of the above
3. Unijunction Transistor (UJT) was previously known as :
 - (a) Diode
 - (b) Field effect transistor
 - (c) MESFET
 - (d) MOSFET
4. The gate of JFET is biased.
 - (a) Reverse
 - (b) Forward
 - (c) Reverse as well as forward
 - (d) None of the above
5. The transferred electron bulk effect occurs in :
 - (a) Silicon
 - (b) Germanium
 - (c) Indium phosphide
 - (d) Metal semiconductor junction
6. For Gunn diodes GaAs is preferred to Si because the former :
 - (a) can handle higher power densities

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- (b) has a higher ion mobility
 - (c) has a suitable impurity energy band
 - (d) has a lower noise at microwaves
7. Source of light for fibre optic system is :
- (a) LED
 - (b) LDR
 - (c) Photodiode
 - (d) Gunn diode
8. Triac is a which type(s) terminal device ?
- (a) One
 - (b) Two
 - (c) Three
 - (d) Four
9. A diode which has zero breakdown voltage is known as :
- (a) Tunnel diode
 - (b) Zener diode
 - (c) Backward diode
 - (d) None of the above
10. A MOSFET can be operated with :
- (a) Negative gate voltage
 - (b) Positive gate voltage
 - (c) Positive as well as negative voltage
 - (d) None of the above

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11. In LED required power per digit is :
- (a) 10-250 μ W
 - (b) 10-250 MW
 - (c) 10-250 volts
 - (d) None of the above
12. The Gunn diode device is also known as :
- (a) Transferred electron devices
 - (b) Transferred electron oscillations
 - (c) Bulk effect oscillation
 - (d) All of the above
13. LCD can operate within voltage range :
- (a) 3-20 volt ac
 - (b) 40-80 volt ac
 - (c) 80-100 volt ac
 - (d) 120 to 240 volt ac
14. LED typically have a voltage drop of :
- (a) 1.5 volt to 2.5 volt
 - (b) 3.5 volt to 4.5 volt
 - (c) 1.5 volt to 4.5 volt
 - (d) 1.5 volt to 5 volt

15. MOSFET is which type of device ?

- (a) Bipolar device
- (b) Unipolar device
- (c) Microwave device
- (d) Photonic device

16. Luminescence is due to because of :

- (a) Knocking out of electron by photon
- (b) Photon emitted while excited electron drop down
- (c) Photon emitted while excited electron makes non-radiative recombination
- (d) Photon emitted due to absorption of electron

17. In magneto optic Faraday effect Q is :

- (a) $Q \propto l$, $Q \propto V$
- (b) $Q \propto l^2$, $Q \propto V^2$
- (c) $Q \propto l$, $Q \propto H^2$
- (d) $Q \propto l$, $Q \propto H$

18. The rotation of the plane of polarization depends on :

- (a) The thickness of the crystal
- (b) Angle of incident light
- (c) The ratio of P/E
- (d) None of the above

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19. A solar cell is a :

- (a) P type semiconductor
- (b) N type semiconductor
- (c) Intrinsic type semiconductor
- (d) P-N junction

20. What is the difference between photodiode and solar cell ?

- (a) No external bias in photodiode
- (b) No external bias in solar cell
- (c) Large surface area in photodiode.
- (d) No difference

Section—B

2 each

(Very Short Answer Type Questions)

Note : Attempt all questions.

1. What is Peak Reverse Voltage (PRV) in the SCR ?
2. Define photovoltaic energy conversion process.
3. Define non-linear optics.
4. Define thyristors.
5. How does LED differ from an ordinary diode ?
6. Define non-linear optics.
7. Explain electro-luminescence.
8. What is Gunn diode ?

Section—C

3 each

(Short Answer Type Questions)

Note : Attempt any *eight* questions.

1. Explain numeric display.
2. Explain photodiode.
3. Explain voltage gradient in U. J. T.
4. Define magneto optic effect.
5. Draw the diagram of MIS diode.
6. How an LDR can be used as an overlight detector ?
7. Explain voltage ampere characteristics of SCR.
8. Explain birefringence.
9. Explain visible and infrared SC laser.

Section—D

5 each

(Long Answer Type Questions)

Note : Attempt any *four* questions.

1. Explain working principle, system and applications of SCR.
2. Discuss working principle and energy band diagram of tunnel diode.
3. Explain modulation of light and numeric display.
4. Explain electro optic effect with example.
5. Explain working and applications of MESFET.