

2020

ELECTRONICS — GENERAL

Paper : DSE-A-2

(Photonic Devices and Power Electronics)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Day 2

Answer **question no. 1** and **any four** from the rest.

1. Answer **any ten** (Multiple choice) questions :

1×10

- (a) LED were built up of semiconductor
- | | |
|-----------|---------|
| (i) Si | (ii) Ge |
| (iii) GaP | (iv) Be |
- (b) PIN diode consists of
- | | |
|---------------------------|--------------------------|
| (i) 2 operating regions | (ii) 3 operating regions |
| (iii) 4 operating regions | (iv) 5 operating regions |
- (c) Which of the following is a unique property of LASER?
- | | |
|-----------------|------------------|
| (i) Directional | (ii) Speed |
| (iii) Coherence | (iv) Wave length |
- (d) The optical properties of liquid crystal depends on the direction of
- | | |
|-------------|------------|
| (i) Air | (ii) Solid |
| (iii) Light | (iv) Water |
- (e) Which of the following loss occurs inside the fibre?
- | | |
|--------------------|------------------|
| (i) Radiative loss | (ii) Scattering |
| (iii) Absorption | (iv) Attenuation |
- (f) Which of the following has more distortion?
- | | |
|----------------------------------|-------------------------|
| (i) Single step index fibre | (ii) Graded index fibre |
| (iii) Multimode step index fibre | (iv) Glass fibre |
- (g) IGBT possess
- | | |
|--------------------------------|-------------------------------|
| (i) low input impedance | (ii) high input impedance |
| (iii) high on-state resistance | (iv) second breakdown problem |

Please Turn Over

- (h) Which terminal does not belong to the SCR?
(i) Anode (ii) Cathode
(iii) Base (iv) Gate
- (i) Among the following, the most suitable method to turn on SCR device is the
(i) Gate triggering (ii) dv/dt triggering
(iii) forward voltage triggering (iv) temperature triggering
- (j) Which of the following materials cannot be used as solar cell material?
(i) Si (ii) GaAs
(iii) CdS (iv) PbS
- (k) Triac is a _____ thyristor
(i) tridirectional (ii) unidirectional
(iii) multidirectional (iv) bidirectional
- (l) Which of the following device is not a power electronic device?
(i) Thyristor (ii) SCR
(iii) DIAC (iv) Photodiode.
2. (a) Explain the operation of Light Emitting Diodes (LED).
(b) Describe direct and indirect band gap materials.
(c) Which material is required for LED? 5+4+1
3. (a) Explain how population inversion can be created in LASER.
(b) What is stimulated emission?
(c) What are desired properties of a good LASER? 4+2+4
4. (a) Explain the term 'Numerical Aperture' in optical fibre.
(b) Explain the problem of using multimode step index fibre and state how it can be solved.
(c) For a step index fibre the normalized frequency γ is 26.6 at a wavelength of 1300 nm. Determine the Numerical Aperture if the core radius r is 25 μm . 2+4+4
5. (a) Explain the operation of p-i-n photodiode.
(b) Describe Quantum Efficiency of a 'p-i-n' diode.
(c) How does photo multiplier tube work? 4+2+4
6. (a) Describe the structure of Liquid Crystal Display (LCD).
(b) What are advantages of LCD over CRT display?
(c) Explain the operation of solar cell. 4+2+4

(3)

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7. (a) Compare the performance of DIAC and TRIAC.
(b) Explain the operation of SCR with necessary diagram.
(c) Why SCR is called controlled rectifier? 3+5+2
8. (a) Write a short note on 'IGBT'.
(b) What are the needs of Heterostructure in optical device?
(c) How phase controlled rectification can be achieved using SCR? 4+2+4
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