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Paper Id: 2 3 1 2 1 2 Roll No. [redacted]

M.TECH.
(SEM-II) THEORY EXAMINATION 2017-18
OPTOELECTRONICS

Time: 3 Hours *Total Marks: 100*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Mention some important LED materials.
b. What are the advantages of monolithic opto electronic integration?
c. What are the advantages of liquid crystal display?[
d. What is meant by contact potential at the p-n junction?
e. What is meant by laser action?
f. Define internal quantum efficiency of a laser?
g. How does the LED Work?
h. What is a photodiode?
i. Define V-number of fiber.
j. What is the condition for total internal reflection?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. Explain the operation of LED and derive an expression for the frequency response and bandwidth of an LED.
b. Explain the self-electro-optic device?
c. Explain avalanche photo diode and also explain effect of temperature on avalanche gain.
d. Explain the working of semiconductor laser. What is threshold condition for lasing action?
e. Explain the principle and operation of wave guide coupler, interferometer and active directional coupler switch.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are the major advantages of LED over LCD?
(b) Discus in detail the principle and operation of a photonic switch based on Self electro optic Device (SEED).

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the self-electro-optic device?
(b) Give the principle and design of optical amplifiers.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are optical sensors describe different types of optical sensors and applications.

(b) Explain various requirement of optical detector. Explain the working principle of PIN diode.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Discuss the different types of noises in the photodiodes.

(b) With a neat diagram, enumerate the different mechanisms that contribute to attenuation in optical fiber.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are the various advantages of optical fiber communication system?

(b) Discuss the theory of laser emission and population inversion.