B.Tech Sem – VII (2007 Course) (Electronics Engg.) : SUMMER - 2019

SUBJECT : ELECTIVE – I : OPTO ELECTRONICS

Day : Thursday
Date : 16/05/2019

S-2019-3191

Time : 02.30 PM TO 05.30 PM
Max. Marks : 80

N. B.

1) **Q. No. 1** and **Q. No. 5** are **COMPULSORY**. Out of remaining attempt **ANY TWO** questions from each section.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in SAME answer books.
4) Assume suitable data, if necessary.

SECTION – I

Q. 1 **a)** Draw and explain characteristics of Laser diode. **(05)**

b) Derive expression for quantum efficiency and responsivity. **(05)**

c) Describe working of LCD display. **(04)**

Q. 2 **a)** Write construction and working of LED. Also state its advantages and drawbacks. **(07)**

b) Determine the coupling efficiency of an optical source coupled into the fiber, for given data: **(06)**

$Transmissivity\ (T) = 1\ (air)$,

$n_0 = 1$

$N.A. = 0.3$

$x = y$

Where x is radius of fiber core

y is half length of optical source.

Q. 3 **a)** Define : **(07)**

i) Quantum efficiency

ii) Responsivity

When 3×10^{11} photons each with a wavelength of $0.85\ \mu m$ are incident on a photodiode on average 1.2×10^{11} electrons are collected at the terminals of the device. Determine quantum efficiency and responsivity of the photodiode at $0.85\ \mu m$.

b) Explain optical detection process in p-n photodiode. **(06)**

Q. 4 **a)** Describe working of Bar graph display and alphanumeric display with suitable diagram. **(07)**

b) Describe operation of Holographic technique. **(06)**

P. T. O.

SECTION – II

Q. 5 **a)** What are different types of optical fibers? Describe any two types with diagrams. **(05)**

b) Describe 'Power launching' in fiber. **(05)**

c) Write note on: Short haul links. **(04)**

Q. 6 **a)** Determine the cut off wavelength for a step index fiber to exhibit single mode operation when the core refractive index and radius are 1.46 and 4.5 μm respectively, with the relative index difference being 0.25 % **(07)**
[Given: For single mode step index fiber the cut off normalized frequency (V_c) = 2.405].

b) Describe the attenuation measurement technique. **(06)**

Q. 7 **a)** Describe operation of LED drive circuits for analog and digital transitions. **(07)**

b) Define : **(06)**

i) Optical power budget

ii) Rise time budget

Q. 8 **a)** Briefly describe wavelength division multiplexing. **(07)**

b) Write applications of optical communication in different areas. **(06)**

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