Exam.Code:0969
Sub. Code: 7036

2123

M.E. (Electronics and Communication Engineering)
First Semester
ECE-1102: Fiber-Optics Communication Systems
(For UIET only)

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt <u>five</u> questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

1. Attempt all Questions: - (2*5= 10 Marks)

a) What are Graded Index Fibers and why are they used in optical communication? Explain briefly with the help of a diagram.

b) Explain material dispersion.

c) What do you understand by emission and absorption rates in respect to optical transmitters?

d) Explain the eye diagram and BER as system performance parameters?

e) Write a short note on i) NRZ modulation ii) RZ modulation

<u>Section- A</u>

2.

a) List the advantages and disadvantages of Optical communication. Further, Calculate carrier frequency for optical communication system operating at 1.55 and 0.88 micro meters? (5 Marks)

b) Differentiate between phase and group velocity. (5 Marks)

3.

a) A multimode fiber with 50 micro meter core diameter is designed to limit the intermodal dispersion to 10ns/km. what is the numerical aperture of this fiber? What is the limiting bit rate for transmission over 10 km at 0.88 micro meters? Assume Refractive index of cladding as 1.45. (5 Marks)

b) Explain how non linearity affects the performance of optical network. (5 Marks)

4.

a) Differentiate between Radiative and Non-radiative recombination. (5 Marks)

b) Draw the structure, basic operating characteristics, and transient response of LED. (5 Marks)

P.T.O.

Section - B

5.

a) Explain the impact ionization in Avalanche photodiodes. Define photo multiplication factor and cutoff wavelength of the photodiode. (5 Marks)

b) Calculate the responsivity of a p-i-n photodiode at 1.3 and 1.55 micro meter if the quantum efficiency is 80%. Why is photodiode more responsive at 1.55 micro meters? (5 Marks)

6.

a) Generalize the principle of operation of a semiconductor Optical amplifier (SOA) with a neat diagram. (5)

b) Sketch the major elements of an EDFA and describe the operation of the device. Indicate the benefits of EDFA in comparison to those associated with semiconductor optical amplifier. (5 Marks)

7.

a) While designing an optical transmission system what are the main factors that influence the link power budget? (5 Marks)

b) List the major passive components required for implementation of DWDM (5 Marks)

x-x-x