University of Mansoura

Faculty of Engineering

Dept. of Electronics & Communics.

3rd Year Electronics

Course Code: 9325

Full Mark: 70

Time Allowed: 3 hrs.

Date: 5/6/2014

OPTICAL ELECTRONICS

USE NEAT SKETCHES TO CLARIFY YOUR ANSWERS:

1) A- State the advantages and main applications of optical communications.

   B- Ray optics can explain some phenomena in optical fiber but can't explain others - Explain.

2) A-   Derive an expression for the maximum acceptance angle in step-index fiber and its relation with the numerical aperture.

   B-   State the main types of optical fibers and compare between single-mode and multimode fibers.

3) A- Define the attenuation windows in optical fibers and explain in detail the sources of signal attenuation and how to minimize their effects.

   B- Derive an expression for the total number of modes in multimode fibers in fiber parameters.

4) A- Define the signal dispersion in optical fiber and derive an expression for the material dispersion factor D (Λ) and explain how to minimize it.

   B- Derive an expression for the intermodal dispersion in optical fiber and how to minimize it.

5) A- State the main requirements for optical sources used in optical communication and explain why ternary semiconductor alloys are used.

   B- State the main requirements for photo detectors in optical link.

6) A- Define the responsivity of photo detectors and derive an expression for the quantum efficiency in pin diode.

   B- A step-index fiber has core and cladding indices   1.5   and   1.47. If it supports 200 modes at 1300 n.m,   find :

   • the numerical aperture

   • the maximum acceptance angle and its core diameter

بالتوفيق

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