



**Optical communication (610535)3**

**Instructor: Dr. Abdel-Rahman Al-Qawasmi**

**Semester: 2<sup>nd</sup> 2001/2002**

**Exam: Second**

**Prerequisite :Communication II**

**Engineering Faculty**

**Electrical & communication Dept.**

**Date : 13/5/2002**

**Time : one Hour**

**Question1:**

Complete the Table Below .Show details of your Computation (4 marks)

Construction	(n <sub>1</sub> )	(n <sub>2</sub> )	NA	α <sub>0</sub>	Δ	θ <sub>c</sub>
	1.47				0.027	
		1.4				26.1°
All-Plastic	1.5		0.47			

Where n<sub>1</sub>, n<sub>2</sub>-Refractive Indexes.  
 α<sub>0</sub>-Incident Angle  
 θ<sub>c</sub>-Critical Angle

NA-Numerical Aperture  
 Δ-Fractional refractive Index Change

**Question2:** a)-Graded Index Fiber has Effective Refractive Index 1.52 and having Parabolic Profile with n<sub>1</sub>=1.48. If wavelength equal 1.25 micrometers and Core Radius =4.75 micrometers. Compute

1- n<sub>2</sub>

2- Spot Size

(6 marks)

**Question3:** A lighting-Emitting Diode is Modulated by a current Source with frequency 100 Mega Hertz and peak Signal Current 98 mA. If a dc bias current equal 10 mA:

- 1- Compute Total Diode current when t=3 micro Seconds
- 2- Determine the Peak Signal Power if the Carrier Life Time = 2 ns and Slope=1.
- 3- F<sub>3-dB</sub>

(7 marks)

**Question4:** 1- Compute the Responsivity of a Detector having a quantum efficiency of 2% at 0.89 micrometers.

2- Compute the Voltage across a 60 ohms load resistor when optic power absorbed by the Detector is 1 microwatts.

(e =1.6.10<sup>-19</sup> , h=6.63.10<sup>-34</sup> , c=3.10<sup>8</sup>)

(2 marks)

**Question5:** 1- what is the Maximum frequency of light that can be detected by Vacuum photodiode if the work function is 2 electron volts.

2- write and plot three Optic fiber Cables. Write three requirements of a good fiber. (3 marks)

(Good Luck)