Question1:(10 marks)

a- Explain the effect of temperature on LD. Why this occurs and give two methods to reduce this effect.

b- Write the four packaging requirements for LD.

Question2:(7 amrks)

a- Compute the current amplification in photomultiplier tube if the gain at each dynode is 5 and there are nine dynodes.

b- What is the major limitation to high-frequency modulation? Explain.

c- Write three advantages of LD over LED.

Question3:(8 marks)

a- Plot and write the principle of work for vacuum photodiode.

b- Commute the cutoff wavelength for Silicon and Germanium PIN diodes. Their band gab energies are 1.1eV and 0.67eV respectively.

c- A coupler has an excess loss of 1 db and a splitting ratio of 9:1. How much of the input power reaches the two output terminals.

Coupler description	L_{TAP}(dB)	L_{THP}(dB)	Splitting ratio
3 dB	3	3	1:1
6 dB	6	1.25	3:1
10 dB	10	0.46	9:1
12 dB	12	0.28	15:1

Question4:(15 marks)

Compute the power and bandwidth for communication analog system that transmits a video signal by Internet and using SI multimode Fiber. The system has the following requirements:

1- Signal bandwidth 6 MHz.

2- Signal to noise ratio $S/N=10^7$

3- LED with range (0.8-0.9)μm

4- Silicon PIN photodetectors with capacitance=4pF, Responsivity=0.5 A/W, equivalent temperature 400 K and V_{bias}=4 V. (k-Boltzman constant=$1.38.10^{-23}$)

5- Multimode SI fiber, NA=0.25, optic bandwidth f_{3-dB} X L=30 MHz X Km, loss of 5dB/km and 50-μm core diameter.

Question5:(10 marks)

Find the output current of a photodetector whose quantum efficiency is 0.9, the wavelength is 1.3 μm and the incident power level is –37 db. Also compute the resulting output voltage if the load resistance is 50 ohm, and 1000 ohm.

GOOD LUCK