(c) A continuous 12 km long optical fiber link has a loss of 1.5 db/km.

(i) What is the minimum optical power level that must be launched into the fiber to maintain an optical power level of 0.3μm at the receiving end ?

(ii) What is the required input power if the fiber has a loss of 2.5db/km² ?

5. Attempt any **four** parts of the following : **(5×4=20)**

(a) Optical Power Budgeting.

(b) Discuss Hetro-Junction in LED Diodes.

(c) Compare and contrast Direct and Coherent detection method.

(d) Explain the working of a Heterodyne detection technique suitable for optical fiber communication.

(e) Describe the principle of Optical Power Meter.

(f) Write a short note on Noise sources in optical fiber communication.

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2726 **Roll No.** | | | | | | | | | | |

B.Tech.

(SEM. VII) THEORY EXAMINATION 2011-12

OPTICAL COMMUNICATION

Time : 3 Hours *Total Marks : 100*

Note :– (1) Attempt all questions.

(2) **All** questions carry equal marks.

1. Attempt any **four** parts of the following : **(5×4=20)**

(a) Draw the block diagram of optical fiber communication system. Enlist the advantages of optical communication.

(b) What do you mean by Acceptance Angle of an optical fiber, show how it is related to refractive index of the fiber core, cladding and medium where fiber is placed ?

(c) Explain following :

(i) Normalized propagation constant

(ii) Mode field diameter

(d) A graded index fiber has a core with a parabolic refractive index profile and diameter 40μm. Numerical aperture is 0.2. Estimate the total number of guided modes for a wavelength of 1μm.

(e) Differentiate between meridional and skew rays. An optical fiber in air has NA 0.4; compare the acceptance angle for skew rays which changes direction by 100° at each reflection.

(f) What do you understand by Inter Symbol Interference (ISI) ? A multimode graded index fiber exhibits total pulse broadening of 0.1μs over a distance of 15 km.

Estimate :

(i) The maximum possible bandwidth without ISI.

(ii) Pulse dispersion per unit length.

2. Attempt any **four** parts of the following : **(5×4=20)**

(a) Discuss the Vapor-phase oxidation technique in preparation of Low-Loss optical fiber.

(b) What do you understand by scattering loss ? Describe its types with Expressions.

(c) Discuss various dispersion mechanisms.

(d) Explain in brief the propagation characteristics of single and multimode fibers.

(e) Explain the principle of semiconductor lasers and draw the emission characteristic.

(f) A ruby laser crystal is 4cm long (n = 1.78). The peak emission wavelength is 0.55μm. Determine the number of longitudinal modes and their frequency separation.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) Explain the physical principle of APD. What is the temperature effect on Avalanche Gain ? Describe Automatic gain control using Op-Amp.

(b) Explain a Digital signal transmission setup suitable for fiber optic communication.

(c) What is the significance of intrinsic layer in PIN diode ? What is the principle of working of PIN diode ?

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) Write short notes on the following :

(i) Multi channel transmission techniques

(ii) WDM.

(b) (i) With the help of a neat block diagram, explain the principle of working of Point to Point digital link.

(ii) A 32×32 port multimode coupler (fiber transmissive star coupler) has 1mW of official power Launched to a single input port. The average optical power measured for each output port is 14μW. Evaluate the total loss incurred through the device and average insertion Loss.