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Total No. of Questions : 09] [Total No. of Pages : 02

B.Tech. (Sem. 7th/8th)

OPTICAL FIBER COMMUNICATIONS

SUBJECT CODE : EC - 404

Paper ID : [A0329]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 × 2 = 20)*

a) List the various advantages of fiber optical communication system.

b) Calculate the carrier frequency for an optical communication system operating at 1310 nm.

c) Distinguish between RZ & NRZ modulation format.

d) What is the difference between loose & tight buffer fibers in terms of operation?

e) How light radiation occurs in a p-n junction semiconductor?

f) What do you understand carrier lifetime of charge carriers in photo detectors.

g) Explain red and blue shift in optical communication systems.

h) What is speckle noise?

i) Why mode partitioning noise is dominant in single mode fibers?

j) Give your comments upon the statement, "Optical & electrical noises are different".

Section - B

(4 × 5 = 20)

Q2) Explain the physical meaning of each Maxwell equations.

Q3) What is the difference between Dispersion and Distortion?

Q4) Explain the working principle of DFB laser diodes with suitable diagram?

Q5) A SMF has a normalized frequency 2.40, a core refractive index 1.47 & cladding 1.465 & a core diameter of 9 μm. Find insertion loss if it is having lateral offset of 1μm.

Q6) What is Sub Carrier Multiplexing? Explain with suitable example.

Section - C

(2 × 10 = 20)

Q7) Draw the block diagram of optical communication system and describe the function of each block.

Q8) Why the junction capacitance & resistance of a photodiode varies with the junction voltage & load resistance. Also list the advantages of using reverse bias in a photodiodes.

Q9) Suppose an avalanche photodiode has the following parameters: I_L =1 nA, I_D = 1nA, n = 0.85, F = $M^{1/2}$, R_L = $10^3 \Omega$ & B = 1 kHz. Consider a sinusoidaly varying 850 nm signal, which has modulation index m = 0.85 & an average power level P_0 = -50dBm, to fall on the detector at room temperature. Plot the S/N ratio as a function of M for gains varying from 20 to 100. At what value of M does the maximum S/N occurs?

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