

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- SEPT- 2017

B. Tech 7<sup>th</sup> Semester

Electronics and Communication Engineering

COURSE CODE: 10M11E112

MAX. MARKS: 15

COURSE NAME: Advanced Satellite and Fiber Optic Communications

COURSE CREDITS: 03

MAX. TIME: One Hr

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Q. 1(a) What is the optical communication system? Explain it with suitable diagram and discuss the elements of optical communication system. [2]

(b) Derive the mathematical expression for the multipath time delay for step-index fiber. [3]

Q. 2(a) Discuss the need of optical fiber. [2]

(b) A silica optical fiber with a core diameter large enough to be considered by the ray theory analysis has a core and cladding refractive index 1.50 and 1.47, respectively. Determine: 1) Critical angle of core and cladding interface, 2) Numerical aperture for the fiber and 3) Acceptance angle in air for fiber. Discuss the effects when dip it in water. [3]

Q. 3(a) Derive the wave propagation equation in free-space and comment on the propagation constant. [2]

(b) A step-index optical fiber has a solid acceptance angle in air of 0.115 radian and a relative refractive index difference of 0.9%. Estimate the speed of light in the fiber core. [3]