

**JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT**

**TEST -2 EXAMINATION- Oct 2017**

**B. Tech (7<sup>th</sup> Semester)**

**Electronics and Communication Engineering**

**COURSE CODE: 10M11EC112**

**MAX. MARKS: 25**

**COURSE NAME: Advanced Satellite and Fiber Optic Communications**

**COURSE CREDITS: 03**

**MAX. TIME: One Hour Thirty Minutes**

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

- Q. 1(a)** Define the radiation mode in the planar dielectric waveguide? [2]
- (b)** A symmetric step-index planar waveguide is made of glass with  $n_1 = 1.5$  and  $n_2 = 1.49$ . The thickness of the guide layer is  $9.83 \mu\text{m}$  and the guide is excited by a source of wavelength  $\lambda = 0.85 \mu\text{m}$ . What is the range of propagation constant? What is the maximum number of modes supported by the guide? What should be the effects over the number of modes when the source wavelength is:  $\lambda = 1.55 \mu\text{m}$ ? [4]
- Q. 2(a)** Distinguish between the propagation parameters  $\gamma$ ,  $\beta$  and  $b$ . How are they interrelated? Discuss the maximum and minimum values of  $b$  and its significance. [2]
- (b)** Derive the expression for maximum number of modes propagates in step-index planar dielectric waveguides. [4]
- Q. 3(a)** What are modes? How does one distinguish between symmetric and asymmetric modes of a planar step index waveguide? [2]
- (b)** What should be the maximum thickness of the guide slab of a symmetric step-index planar waveguide so that it supports only the fundamental TE mode? Consider  $n_1 = 3.6$ ,  $n_2 = 3.56$ , and  $\lambda = 0.85 \mu\text{m}$ . [4]
- Q. 4 (a)** How is the multipath time dispersion phenomenon rectified in the graded index fiber? Explain with suitable diagram. [3]
- (b)** Derive the expression for TE-mode in symmetric step-index planar waveguide and discuss the role of normalized frequency parameter. [4]