

R16

Code No:138DY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech IV Year II Semester Examinations, July - 2021

OPTICAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any Five Questions
All Questions Carry Equal Marks**

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- 1.a) What are the advantages of optical fibers and why generally this is not used for long distance communications?
b) What is the role of MCVD in the fabrication process of optical fiber?
c) What are the range of low transmission windows in an early optical fibers? [7+4+4]
- 2.a) How snell's law is used to describe the refraction at the interface between two different light transmitting materials?
b) Find the Numerical Aperture of multimode step index fiber has core index 1.42 and an index difference is 0.01.
c) How light is propagated in step index optical fiber? Explain it with suitable diagrams. [4+4+7]
3. Define and distinguish the following losses with respect to optical fiber.
a) Scattering b) Bending c) core d) cladding. [15]
- 4.a) Explain the principle of working of a high radiance surface emitting LED with a neat schematic structure diagram.
b) What is a LASER action? How it is used to generate a light and used for optical fibers? [8+7]
- 5.a) How photo carriers are generated in pin diode and hence generates the electric field?
b) What is responsivity and how is used to measure the performance of photo diode? [8+7]
- 6.a) Explain controlled-fracture technique for cleaving fibers with suitable diagram.
b) What are the principle requirements of a good connector for optical fibers? [8+7]
- 7.a) A 2×2 biconical tapered fiber coupler has an input optical power level of $P_0=200\mu\text{W}$. The output powers at the other three ports are $P_1= 90 \mu\text{W}$, $P_2= 85 \mu\text{W}$, and $P_3=6.3 \text{ nW}$. Find coupling ratio, insertion loss, excess loss and crosstalk.
b) What are the key system features of WDM and how it differ from FDM? [8+7]
- 8.a) What are the different system parameters needed to analyze the link?
b) How link power budget analysis is used to determine the power margin in optical systems? [5+10]

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