ABES Engineering College, Ghaziabad

Department of Applied Sciences & Humanities

Session: 2023-24 **Semester: II** **Section: Common to All**

Course Code: BAS201 **Course Name: Engineering Physics**

1. Determine the numerical aperture of a step index fibre when the core refractive index n_1 = 1.5 and cladding refractive index n_2 = 1.48. Find the maximum angle forentrance of light if the fibre is placed in air. **(NA = 0.244, i0= 14.13º) (2009)**
2. Calculate the numerical aperture, acceptance angle and critical angle of the fibre from the following data: n_1 = 1.5 and n_2 = 1.45. **(NA = 0.385, i0 = 22.63º, θC = 75.3º)(2009, 2012, 2018)**
3. Calculate the refractive indices of the core and cladding material of a fibre from thefollowing data: NA = 0.22, Δ = 0.012. **(n_1 = 1.42 and n_2 = 1.4)**
4. A step index fibre has core refractive index 1.466, cladding refractive index 1.46. If the operating wavelength of the ray is 0.85 μm, calculate the cut-off parameterand the number of modes which the fibre will support. The diameter of core = 50 μm**. (V = 24.75, N = 306) (2011)**
5. Calculate the V number for a fiber of core diameter 40 μm and RI of 1.55 and 1.50 respectively for its core and cladding when a light of wavelength 1400nm is propagating. Also calculate the number of modes that the fibre can support for the propagation. (**V=34.75 and modes 611) (2023-24)**
6. Calculate the maximum radius allowable for n_1 = 1.53 and n_2 = 1.5 operating at wavelength 1300 nm. **(radius = 1.65 μm) (2015)**
7. The optical power, after propagating through a fibre that is 500 m long is reducedto 25% of its original value. Calculate the fibre loss. **(loss = 12.042 dB/km) (2014,2017)**
8. Calculate the fiber loss through the optical fiber when the mean optical power launched into a 5 km length of fiber is 120 $x10^{-6}$ W and the mean optical power at receiver is $4x10^{-6}$W.**(2022-23)**
9. A communication system uses 10 Km fibre having a loss of 2.5 dB/km. Compute the output power if the input power is 500 μw. **(Po = 1.58 μW) (2022)**
10. In a Ruby laser, total number of Cr^{+3} ions is 2.8×10^{19}. If the laser emits radiation of wavelength 7000 Å. Calculate the energy of the laser pulse. **(7.94 J) (2006)**
11. Calculate the population ratio of two states in He-Ne laser that produces light of wavelength $6000A^0$ at $27\ ^0$C. **($N_2/N_1= e^{-80}$) (2018)**
12. Calculate the relative population of two states of the laser that produces light of wavelength 5461 Å at 300K. (Boltzmann constant K= 8.6× 10 -5 eV/K). **($N_2/N_1= e^{-88}$) (2019- 2020).**