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Reg. No :

Code No. : 6371

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M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2013.

First Semester

Physics

Elective – OPTOELECTRONICS AND LASERS

(For those who joined in July 2012 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Light is an electromagnetic wave of
(a) High frequency (b) Low frequency
(c) High wavelength (d) High wave vector
2. In EM waves, polarization is caused by
(a) Refraction (b) reflection
(c) diffraction (d) superposition

3. Any system conductors and insulators for carrying EM waves
(a) resonator (b) antenna
(c) wave guide (d) transmitter
4. The cutoff wavelength is the value of λ for which λ_p becomes
(a) zero (b) one
(c) two (d) infinity
5. The cladding which surrounds the fiber core is used to
(a) Reduce optical interference
(b) protect the fiber
(c) Guide the light in the core
(d) ensure refractive index as Constant
6. Approximately what is the frequency limit of the optical fibre?
(a) 20 GHz (b) 1 MHz
(c) 100 MHz (d) 40 MHz
7. To achieve laser action it is necessary
(a) Population inversion
(b) Pumping rate
(c) Doppler broadening
(d) Optical absorption



8. Smaller the line width, the higher the

- (a) Losses
- (b) Q factor of the cavity
- (c) Line width
- (d) quantum yield

9. What is the source of Rainbow holograms

- (a) Monochromatic source
- (b) IR source
- (c) White light
- (d) UV source

10. To record a reflection hologram on which side of the photographic emulsion the object and reference waves are introduced

- (a) Front side (b) opposite side
- (c) back side (d) upper side

PART B — (5 × 5 = 25 marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Discuss about pulse distortion with diagram.

Or

(b) Explain reflection at a plane boundary with diagram.

12. (a) Discuss about coupling to wave guide.

Or

(b) Explain the advantages of integrated wave guides.

13. (a) Explain about the attenuation due to absorption and scattering in fibres.

Or

(b) Describe the modes in graded index fibre.

14. (a) Explain and obtain the line shape function in laser.

Or

(b) Describe the construction and working of doped insulator laser.



15. (a) Explain about practical problems in holography.

Or

- (b) Write a short note on holography computer memories.

PART C — (5 × 8 = 40 marks)

Answer ALL the questions, choosing either (a) or (b).

16. (a) Explain in detail about the resonant cavities and their characteristics.

Or

- (b) Explain the reflection at critical angles and their importance.

17. (a) Describe about dielectric slab wave guide and the modes formation in asymmetric slab wave guide with suitable diagram.

Or

- (b) Discuss about coupling methods to the wave guide.

18. (a) Describe the construction and working of step and graded index fiber optic wave guides.

Or

- (b) Discuss about pulse distortion and information rate in optic fibre.

19. (a) Describe the construction and working principle of Nd — YAG laser with diagram.

Or

- (b) Discuss about mode locking and its types in detail.

20. (a) Explain the linearity and image formation of holographic process.

Or

- (b) Discuss the principle of recording and reconstruction of a Gabour hologram and its limitations.

