(6 pages)

S.No. 373 **17PPHE02**

(For the candidates admitted from 2017-2018 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2017.

First Semester

Physics

Elective – OPTO ELECTRONICS

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The circular waveguides use which function in the frequency calculation.
   (a) Laplace function
   (b) Schottky function
   (c) Bessel function
   (d) Transfer function

2. The phase and group velocities does not depend on which of the following?
   (a) Frequency
   (b) Wavelength
   (c) Phase constant
   (d) Attenuation constant

3. Which process gives the laser its special properties as an optical source?
   (a) Dispersion
   (b) Stimulated absorption
   (c) Spontaneous emission
   (d) Stimulated emission

4. In a Ruby laser, a large number of atoms occupy
   (a) Ground state
   (b) Excited state
   (c) Metastable state
   (d) Normal state

5. In an optical Fiber Communication system, which among the following is not a typical transmitter function?
   (a) Coding for error protection
   (b) Decoding of input data
   (c) Electrical to optical conversion
   (d) Recoding to match input standard

6. A 100 MHz carrier is frequency modulated by 10 KHz wave. For a frequency deviation of 50 KHz, calculate the modulation index of the FM signal

(a) 100 (b) 50

(c) 70 (d) 90

7. The measurement of blood flow, glucose content

(a) physical sensors

(b) chemical sensors

(c) biomedical sensors

(d) none of the above

8. The most familiar single sensor used for image Acquisition is

(a) Microdensitometer

(b) Photodiode

(c) CMOS

(d) None of the above

9. The small section of fiber which is coupled to the optical source is known as

(a) Fly lead

(b) Pigtail

(c) Both (a) and (b)

(d) None of the above

10. Which among the following is responsible for generating attenuation of an optical power in fiber?

(a) Absorption

(b) Scattering

(c) Waveguide effect

(d) All of the above

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Write a short note on fibers.

Or

(b) Explain the electromagnetic field in core and cladding.

12. (a) Distinguish between homojunction lasers and heterostructure lasers.

Or

(b) Explain three level laser with suitable energy level diagram.

13. (a) Discuss briefly DCM modulation.

Or

(b) Derive the expression for noise in PIN photo diode receiver.

14. (a) Discuss the various types of optical fiber sensors.

Or

(b) Explain the simple fiber based sensors for displacement.

15. (a) Describe Michelson interferometer sensor with necessary diagram.

Or

(b) Give the principle and explain fiber gyro.

SECTION C — (5 × 8 = 40 marks)

Answer ALL questions.

16. (a) Write a note on propagation of electromagnetic waves in dielectric wave guides.

Or

(b) Distinguish between phase velocity and group velocity.

17. (a) Describe the population inversion for stimulated emission with the help of energy level diagram.

Or

(b) Explain with neat diagram the, principle, construction and working of a He-Ne laser.

18. (a) Compare between PIN and APD receiver.

Or

(b) Give the principle and explain the acousto-optic modulator.

19. (a) Discuss intrinsic and extrinsic sensors.

Or

(b) Discuss fiber based sensors for temperature and pressure measurements.

20. (a) Draw a schematic of conventional Mach – Zehnder optical fiber interferometer and explain it.

Or

(b) Discuss in detail the sagnac interferometer.

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