

**SRINIX COLLEGE OF ENGINEERING AND TECHNOLOGY, BALASORE**

**ENGINEERING PHYSICS, SEC=A+B**

**OBJECTIVE QUESTIONS**

1. A device which converts electrical energy in the form of a current into optical energy is called as \_\_\_\_\_
  - a) Optical source
  - b) Optical coupler
  - c) Optical isolator
  - d) Circulator
2. How many types of sources of optical light are available?
  - a) One
  - b) Two
  - c) Three
  - d) Four
3. The frequency of the absorbed or emitted radiation is related to difference in energy  $E$  between the higher energy state  $E_2$  and the lower energy state  $E_1$ . State what  $h$  stands for in the given equation?
$$E = E_2 - E_1 = hf$$
  - a) Gravitation
  - b) Planck's constant
  - c) Permittivity
  - d) Attenuation constant
4. The radiation emission process (emission of a photon at frequency) can occur in \_\_\_\_\_ ways.
  - a) Two
  - b) Three
  - c) Four
  - d) One
5. Which process gives the laser its special properties as an optical source?
  - a) Dispersion
  - b) Stimulated absorption
  - c) Spontaneous emission
  - d) Stimulated emission
6. An incandescent lamp is operating at a temperature of 1000K at an operating frequency of  $5.2 \times 10^{14}$  Hz. Calculate the ratio of stimulated emission rate to spontaneous emission rate.
  - a)  $3 \times 10^{-13}$
  - b)  $1.47 \times 10^{-11}$
  - c)  $2 \times 10^{-12}$
  - d)  $1.5 \times 10^{-13}$

7. The lower energy level contains more atoms than upper level under the conditions of \_\_\_\_\_
- Isothermal packaging
  - Population inversion
  - Thermal equilibrium
  - Pumping
8. \_\_\_\_\_ in the laser occurs when photon colliding with an excited atom causes the stimulated emission of a second photon.
- Light amplification
  - Attenuation
  - Dispersion
  - Population inversion
9. A ruby laser has a crystal of length 3 cm with a refractive index of 1.60, wavelength 0.43  $\mu\text{m}$ . Determine the number of longitudinal modes.
- $1 \times 10^2$
  - $3 \times 10^6$
  - $2.9 \times 10^5$
  - $2.2 \times 10^5$
10. A semiconductor laser crystal of length 5 cm, refractive index 1.8 is used as an optical source. Determine the frequency separation of the modes.
- 2.8 GHz
  - 1.2 GHz
  - 1.6 GHz
  - 2 GHz
11. Doppler broadening is a homogeneous broadening mechanism.
- True
  - False
12. An injection laser has active cavity losses of  $25 \text{ cm}^{-1}$  and the reflectivity of each laser facet is 30%. Determine the laser gain coefficient for the cavity it has a length of  $500 \mu\text{m}$ .
- $46 \text{ cm}^{-1}$
  - $51 \text{ cm}^{-1}$
  - $50 \text{ cm}^{-1}$
  - $49.07 \text{ cm}^{-1}$
13. Longitudinal modes contribute only a single spot of light to the laser output.
- True
  - False
14. Considering the values given below, calculate the mode separation in terms of free space wavelength for a laser. (Frequency separation = 2GHz, Wavelength = 0.5  $\mu\text{m}$ )
- $1.4 \times 10^{-11}$
  - $1.6 \times 10^{-12}$
  - $1 \times 10^{-12}$
  - $6 \times 10^{-11}$

15. What is the principle of fibre optical communication?
  - a) Frequency modulation
  - b) Population inversion
  - c) Total internal reflection
  - d) Doppler Effect
  
16. What is the other name for a maximum external incident angle?
  - a) Optical angle
  - b) Total internal reflection angle
  - c) Refraction angle
  - d) Wave guide acceptance angle
  
17. A single mode fibre has low intermodal dispersion than multimode.
  - a) True
  - b) False
  
18. How does the refractive index vary in Graded Index fibre?
  - a) Tangentially
  - b) Radially
  - c) Longitudinally
  - d) Transversely
  
19. Which of the following has more distortion?
  - a) Single step-index fibre
  - b) Graded index fibre
  - c) Multimode step-index fibre
  - d) Glass fibre
  
20. In which of the following there is no distortion?
  - a) Graded index fibre
  - b) Multimode step-index fibre
  - c) Single step-index fibre
  - d) Glass fibre
  
21. Which of the following loss occurs inside the fibre?
  - a) Radiative loss
  - b) Scattering
  - c) Absorption
  - d) Attenuation

22. What causes microscopic bend?  
a) Uniform pressure  
b) Non-uniform volume  
c) Uniform volume  
d) Non-uniform pressure
23. When more than one mode is propagating, how is it dispersed?  
a) Dispersion  
b) Inter-modal dispersion  
c) Material dispersion  
d) Waveguide dispersion
24. A fibre optic telephone transmission can handle more than thousands of voice channels.  
a) True  
b) False
25. Which of the following is known as fibre optic back bone?  
a) Telecommunication  
b) Cable television  
c) Delay lines  
d) Bus topology

ANSWERS

1.a 2.c 3.b 4.a 5.d 6.d 7.c 8.a 9.d 10.c 11.b 12.d 13.a 14.b  
15.c 16.d 17.a 18.b 19.c 20.a 21.b 22.d 23.b 24.a 25.d

1. Whenever the magnetic flux changes with respect to an electric conductor or a coil, an EMF is induced in the conductor is Faraday's

- first law
- second law
- third law
- fourth law

2. Two parallel plates are separated by a distance  $D$  charged by  $V$  volt. The field intensity  $E$  is given by,

- $V \times D$
- $V / D$
- $V \times D^2$
- $V^2 / D$

3. The right hand rule for determining the direction of the induced EMF was introduced by

- Faraday
- Lenz
- Fleming
- Maxwell

4. Conductor is static and the field is varying then emf will be induced. This principle is called

- virtually induced emf.
- dynamically induced emf.
- static induced emf.
- none of these

5. A conductor of length  $L$  has current  $I$  passing through it, when it is placed parallel to strong magnetic field. The force experienced by the conductor will be

- BIL.
- $BL^2I$ .
- $BI^2L$ .
- zero.

6. Indicate which of the following material does not retain magnetism permanently.

- (A) Soft iron
- (B) Stainless steel
- (C) Hardened steel
- (D) None of the above

7. The ratio of intensity of magnetization to the magnetization force is known as

- (A) Flux density
- (B) Susceptibility
- (C) Relative permeability
- (D) None of the above

8. Which of the following is not a unit of flux?

- (A) Maxwell
- (B) Tesla
- (C) Weber
- (D) All of the above

9. Temporary magnets are used in

- (A) Loudspeakers
- (B) Generators
- (C) Motors
- (D) All of the above

10. If a conductor is moved back and forth at a constant rate in a constant magnetic field, the voltage in the conductor will reverse polarity.

- (A) True
- (B) False

11. Magnetism of a magnet can be destroyed by

- (A) Heating  (B) Hammering
- (C) By inductive action of another magnet
- (D) By all above methods

12. For which of the following materials the saturation value is the highest?

- (A) Ferromagnetic materials
- (B) Paramagnetic materials
- (C) Diamagnetic materials
- (D) Ferrites

13. The ability of a material to remain magnetized after removal of the magnetizing force is known as

- (A) Permeability
- (B) Reluctance
- (C) Hysteresis
- (D) Retentivity

## ANSWERS

1.a 2.b 3.c 4.a 5.d 6.a 7.b 8.b 9.d 10.a 11.d 12.d 13.d

