OBJECTIVES FOR REFERENCE

TOPIC: LASERS AND OPTICAL FIBER

1. Which of the following is a unique property of laser?

   a)Directional
   b) Speed
   c) Coherence
   d) Wavelength

2. Which of the following is an example of optical pumping?
   a) Ruby laser
   b) Helium-Neon laser
   c) Semiconductor laser
   d) Dye laser

3. What is the need to achieve population inversion?
   a) To excite most of the atoms
   b) To bring most of the atoms to ground state
   c) To achieve stable condition
   d) To reduce the time of production of laser

4. Which of the following is used in atomic clocks?
   a) Laser
   b) Quartz
   c) Maser
   d) Helium

6.Einstein coefficient A21 stands for

   a)reciprocal of life time of excited state
   b)life time of excited state
   c)reciprocal of life time of ground state
   d)life time of ground state

7.Which state is occupied by atoms under conditions of thermal equilibrium?

a. excited state
b. ground state
c. metastable state
d. any energy state

5. The operation of ruby laser is
   a. two level
   b. three level
   c. four level
   d. involve bands

6. Which of the following was the first Laser built in 1960?
   a. He-Ne laser
   b. Ruby laser
   c. Semiconductor laser
   d. YAG laser

7. In three level laser, which state is lower lasing level?
   a. metastable state
   b. ground state
   c. excited state
   d. any state can be lower lasing

8. Inverted population condition in laser action is
   a. non equilibrium condition
   b. equilibrium condition
   c. stable condition
   d. preferred under normal circumstances

9. Mirrors of optical cavity resonator are
   a. ground glass
   b. convex
   c. concave
   d. plane polished mirrors

10. The reason for narrow tube in He-Ne laser

a. atomic collision with tube wall decreases
b. there is no effect of narrow tube in He-Ne laser
c. atomic collision with tube wall constant
d. atomic collision with tube wall increases

11. He-Neon emits

a. Constant wave

b. Continous wave

c. cumulative wave

d. None of these

12. Ruby laser emits

a. Constant wave

b. Continous wave

c. Pulsed wave

d. All of the above

13. What is the output in wavelength of ruby laser?

a) 6943 angstroms
b) 6328 angstroms
c) 5400 angstroms
d) 8000 angstroms

14. Is Ruby laser a gas laser?

a) True
b) false

15. What is the pumping source in Helium – Neon laser?

a) Electrical Pumping
b) Optical
c) Chemical
d) None of the above

16. What is the output in wavelength of Helium-Neon laser?

a) 6943 angstroms
b) 6328 angstroms
c) 5400 angstroms
d) 8000 angstroms

17. Ruby laser is a _____ level laser.

a) Three
b) Four
c) Five
d) Two

18. Helium-Neon laser is a _____ level laser.

a) Three
b) Four
c) Five
d) Two

19. The units for coefficient for stimulated emission is

a) m/kg
b) m-kg
c) m/kg-s
d) m/s

20. Step index fibre sustains only

a. single mode of propagation
b. multimode of propagation
c. both (a)&(b)
d. none of these

21. Acceptance angle is the

a. Minimum angle of incidence
b. Maximum angle of incidence
c. It can be maximum or minimum depending on nature of material used in core

22. Lasers are characterized by

a. large bandwidth
b. narrow bandwidth

23. The reconstruction process in holography involves

a. interference phenomenon
b. diffraction phenomenon
c. both (a)&(b)
d. none of these

24. Can we obtain light amplification in absence of stimulated emission?
(a) Yes
(b) No

25. For single mode fibres, the V-parameter is always

a. ≤ 2.405
b. ≥2.405
c. ≤ 4.205
d. ≥4.205

26. Pumping source preferred for gaseous lasers is

(a) optical pumping
(b) electrical pumping
(c) chemical pumping
(d) X-Ray pumping

27. In the structure of fiber, the light is guided through the core due to total internal _____

a. reflection
b. refraction
c. diffraction
d. dispersion

28. In the structure of a fiber, which component provides additional strength and prevents the fiber from any damage?

a. Core
b. Cladding
c. Buffer Coating
d. None of the above

29. If a fiber operates at 1400nm with the diameter of about 10 μm, $n_1 = 1.30$, $\Delta = 0.80\%$, $V = 3.5$, then how many modes will it have?

a. 6.125
b. 9.655
c. 12.95
d. 16.55

30. Which kind of dispersion phenomenon gives rise to pulse spreading in single mode fibers?

a. Intramodal
b. Intermodal
c. Material
d. Group Velocity

31. Flat quartz plates are sealed at the ends of He–Ne gas laser to obtain

a) non-monochromatic
b) unpolarized laser
c) multidirectional laser
d) Resonance

32. In fiber optics, PCS stands for

a) plastic cladded silica
b) personal communication
c) personal carrier system

d) None of the above

33. Unit of dispersion loss is

a. sec

b. dB/km
c. m
d. ns/km

34. Which cable is preferred for under sea communication?

a) step index multimode
b) multimode
c) single mode
d) graded index multimode

35. Which of the following was the first gas Laser built in 1961?

a) Ruby laser
b) He-Ne laser
c) Semiconductor laser
d) Nd –Yag laser

36.Which among the following fibre optic cables have a core of size 480 μm to 980 μm and made up of polymethylmethacrylate?

a. Glass fibre optic cable
b. Plastic fibre optic cable
c. Plastic clad silica fibre optic cable
d. All of the above

37. A ray of light will undergo total internal reflection if it

a. Goes from rarer medium to denser medium
b. Incident at an angle less than the critical angle
c. Strikes the interface normally
d. Incident at an angle greater than the critical angle

38. The fibres not used nowadays for optical fibre communication system are

a. Single-mode fibre
b. Multimode fibre
c. Coaxial cable
d. Multimode graded-index fibres

39. In single-mode fibres, the cladding diameter must be at least

a. Five times the core diameter
b. Thrice the core diameter
c. Ten times the core diameter
d. Twice the core diameter

40. Numerical aperture is expressed as the

a) NA = sin θa
b) NA = cos θa
c) NA = tan θa
d) NA = sec θa