BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Bachelor of Technology in Computer Science & Engineering
Course Name – Fiber optic Communication
Course Code - OEC-802A
(Semester VIII)

Time allotted : 1 Hrs.25 Min. **Full Marks : 70**

[The figure in the margin indicates full marks.]

Group-A

(Multiple Choice Type Question) 1 x 70=70

Choose the correct alternative from the following :

(1) The core of an optical fiber has a

a) Higher refractive index than the cladding
b) Similar refractive index with the cladding
c) Lower refractive index than air
d) Lower refractive index than the cladding

(2) The loss in signal power as light travels down a fiber is called

a) Dispersion
b) Scattering
c) Absorption
d) Attenuation

(3) If a mirror is used to reflect light, the reflected light angle is ____ as the incident angle

a) Smaller
b) Larger
c) The same
d) Independent

(4) Which theory states that the light wave behaves as if it consists of many tiny particles?

a) Huygen's theory
b) Wave theory of light
c) Nyquist theory
d) Quantum theory

(5) Longitudinal waves do not exhibit

a) Polarization
b) Refraction
c) Reflection
d) Diffraction

(6) _____ is caused by the difference in the propagation times of light rays that take different paths in a fiber.

a) Material dispersion
b) Wavelength dispersion
c) Modal dispersion
d) Delay dispersion

(7) 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

(8) During the design of FOC system, which among the following reasons is/are responsible for an e xtrinsic absorption?

a) Atomic defects in the composition of glass
b) Impurity atoms in glass material
c) Basic constituent atoms of fiber material
d) All of these

(9) In spontaneous emission, the light source in an excited state undergoes the transition to a state wi

th _____

a) Higher energy
b) Moderate energy
c) Lower energy
d) All of these

(10) Which phenomenon causes the dynamic line width broadening under the direct modulation of inj ection current?

a) Modal noise
b) Mode-partition noise
c) Frequency chirping
d) Reflection Noise

(11) In the structure of fiber, the light is guided through the core due to total internal _____

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

(12) The rays which do not intersect the core axis are called

a) meridional rays
b) radial rays
c) helical rays
d) skew rays

(13) For single-mode step index fibers, V-number should be less than

a) 2.4
b) 2.8
c) 4.2
d) 8.2

(14) When the incidence angle is _____ the specified critical angle, the light rays bend along t he intersection line of two different mediums of propagation.

a) more than
b) less than
c) equal to
d) not related with

(15) Usually, various types of transmission media are categorized as:

a) metallic or nonmetallic
b) guided or unguided
c) determinate or indeterminate
d) fixed or unfixed

(16) Fiber optic system has three basic components, in the order. They are:

a) light guide, light source, light detector
b) light source, light guide, light detector
c) light detector, light source, light guide
d) light guide, light detector, light source

(17) Which one of the following is not a guided medium of transmission?

a) Fiber–Optic cable
b) Twisted-pair cable
c) The atmosphere
d) Coaxial cable

(18) Which mechanism is used in Laser Technology for generation of light?

a) Dispersion
b) Stimulated Emission
c) Absorption
d) Spontaneous Emission

(19) When the input and output power in an optical fiber is 120μW & 3μW respectively and the lengt h of the fiber is 8 km, what is the signal attenuation per km for the fiber?

a) 3dB/km
b) 1dB/km
c) 2dB/km
d) 4dB/km

(20) Which of these converts the electrical signal to optical signals?

a) Optical photo detectors
b) Optical modulators
c) Demultiplexers
d) Multiplexers

(21) Which optical devices are adopted or applicable for routing signals from one waveguide to anoth er?

a) Optical Combiner
b) Optical Splitter
c) Optical Coupler
d) None of these

(22) Which among the following is/are responsible for generating attenuation of an optical power in fi ber?

a) Absorption
b) Waveguide effect
c) Scattering
d) All of these

(23) Which kind of dispersion phenomenon gives rise to pulse spreading in single mode fibers?

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

(24) Two light sources are said to be coherent if

a) They vibrate in same phase
b) They vibrate with constant phase difference
c) Both (a) and (b)
d) Either (a) or (b)

(25) Step index fiber sustains only

a) Single mode of propagation
b) multimode of propagation
c) Both (a) and (b)
d) None of these

(26) In a Phototransistor photo current is generated at

a) Emitter base junction
b) Collector base junction
c) Either of the junctions
d) Both the junction

(27) Single mode optical fiber is mainly used for

a) Long haul communication
b) Short haul communication
c) Medium haul communication
d) None of these

(28) An LED source produces light when

a) It is reverse biased
b) Holes and electrons are combined in the depletion region
c) The depletion region becomes wider
d) Electrons are emitted from junction surface

(29) Maximum dispersion occurs in

a) Single mode step index fiber
b) Multimode step index fiber
c) Graded index fiber
d) None of these

(30) Removable joints which allow easy, fast, manual coupling and decoupling of fiber are called

a) Fiber splices
b) Fiber connector
c) Fiber coupler
d) None of these

(31) Which one of the following multiplexing technique involves signal composed of light waves?

a) WDM
b) TDM
c) FDM
d) CDM

(32) In Optical fiber communication, the second window is centered at around

a) 1310 nm
b) 850 nm
c) 1550 nm
d) 3300 nm

(33) A step index fiber has a core with refractive index of 1.50 and a cladding with a refractive index of 1.46. Its numerical aperture is

a) 0.165
b) 0.255
c) 0.344
d) 0.586

(34) Pulse broadening in graded index fiber is due to

a) Intermodal dispersion
b) Intramodal dispersion
c) Both (a) and (b)
d) None of these

(35) Which of the following fibers are suitable for wavelength division multiplexing of signals?

a) Dispersion shifted fiber
b) Dispersion flattened fiber
c) Parabolic index fiber
d) Step index fiber

(36) Light output of a laser is related with increase in drive current, as

a) Below threshold current it increases sharply
b) Above threshold current it increases sharply
c) Below threshold current it decreases sharply
d) The slope remains same for below and above thre shold current

(37) Laser based optical communication system can operate at much higher modulation frequencies th an LED based system, because

a) Laser has faster rise time than LED
b) Light output increases sharply above threshold cu

rrent

c) Light emitted by laser are more directional than LED
d) Laser is a coherent optical source

(38) For an LED, when the carrier lifetime is low, the modulation bandwidth is

a) High
b) Low
c) Unaffected
d) Unknown

(39) Photodetector is a

a) Square law device
b) Linear device
c) Exponential device
d) None of these

(40) In purely single mode operation pulse broadening is due to

a) Intermodal dispersion
b) Intramodal dispersion
c) Large bandwidth
d) None of these

(41) Erbium doped fiber amplifiers operate at which of the following window(s)?

a) Low dispersion window (around 1300 run)
b) Low dispersion window (around 1550 run)
c) Both of the windows
d) None of these

(42) Attenuation in optical fiber is measured in

a) dB/Km
b) dB/br
c) K dB/m
d) d Bm/m

(43) Which of the following is an inherent property of an optical signal and cannot be determined even in principle?

a) Thermal noise
b) Environmental noise
c) Background noise
d) Shot noise

(44) Which optical source-detector combination is suitable for high bandwidth long haul communication?

a) LED – Pin diode
b) LASER diode - APO
c) LED – LASER diode
d) LED - APO

(45) The suitable material for an optical detector is

a) A direct band gap semiconductor
b) An indirect band gap semiconductor
c) A metal
d) None of these

(46) For short haul optical communication, the suitable optical fiber is

a) Single mode step index fiber
b) Multimode step index fiber
c) Graded index single mode fiber
d) Graded index multimode fiber

(47) Which of the following detectors is suitable for detection of weak optical signal?

a) P-n photodiode
b) P-i-n photodiode
c) Avalanche photodiode
d) photoconductor

(48) Which of the following materials is suitable for making a light source operating in the near infrared region (800-900nm)?

a) GaAlAs
b) GaAs
c) Si
d) None of these

(49) Total internal reflection (TIR) is associated with

a) Brewster angle
b) Critical angle
c) Normal incidence
d) None of these

(50) Given step-index optical fiber parameters $n_1 = 1.45$, $n_2 = 1.444$, core radius = 4.2 μm, and operating wavelength of 1550 nm, V-number of the fiber is

a) 2.73
b) 3.45
c) 2.24
d) 2.91

(51) In a semiconductor material, as temperature increases

a) Probability of energy states below E_F being occupied increases
b) Probability of energy states above E_F being occupied remains the same
c) Probability of energy states above E_F being occupied decreases
d) Probability of energy states above E_F being occupied increases

(52) Solitons are pulses which propagates through fiber without showing any variation in _____

a) Amplitude
b) Velocity
c) Shape
d) All of these

(53) In optical communication, as optical power is increased, BER goes on decreasing till a certain BER value is reached after which BER goes on increasing. This increase in BER is observed because of

a) Non-linear effects
b) Dispersion
c) Attenuation
d) Thermal Noise

(54) For obtaining maximum source to fiber coupling efficiency, the parameter of the fiber which should be matched with that of the source is

a) Spot size
b) Geometric aperture
c) Both (a) and (b)
d) None of these

(55) In case of all optical technology, the wavelength of source should be

a) 0.67 μm
b) 0.58 μm
c) 1.55 μm
d) 1.33 μm

(56) For communication of information, the fiber generally employed is_____.

a) Single-mode fiber
b) Dual mode fiber
c) Multimode fiber
d) None of these

(57) Optical nonlinearity is responsible for _____

a) Broadening of pulses
b) Compression of pulses
c) Both a and b
d) Long repeater spacing communication

(58) The efficiency of an LED for generating light is directly proportional to the

a) Temperature
b) Level of doping
c) **Applied voltage**
d) Current injected

(59) Which diode is used for measuring light intensity?

a) Varactor diode
b) Tunnel diode
c) Junction diode
d) **Photodiode**

(60) LED made using GaAS emits radiation in

a) Visible region
b) **Infrared region**
c) Microwave frequency region
d) Ultraviolet region

(61) Which one of the following is not LED material?

a) **SiO_2**
b) GaAs
c) GaP
d) SiC

(62) For effective coupling from fiber to detector, the detector should have

a) Small size and low bias voltage
b) Small size and high bias voltage
c) Large size and low bias voltage
d) Large size and high bias voltage

(63) If two optical fibers with different diameters are to be spliced, which of the following mechanical splices will be most suitable?

a) Sung tube splice
b) Loose tube splice
c) Spring groove splice
d) V- groove splice

(64) The function of WDM is to

a) Separate signals at different wavelengths and couple them to different detectors

b) Combine signals at different wavelengths to pass through a single fiber

c) Tap off part of the energy of the incoming signal

d) Change the transmission speed of the input signal

(65) LEDs operate correctly when it is_____.

a) Reversed biased

b) Forward biased

c) Both (a) and (b)

d) None of these

(66) Electromagnetic wave travel at

a) $3*10^8$ km/sec

b) $3*10^8$ meter/sec

c) $8*10^3$ km/sec

d) $3*10^8$ meter/hour

(67) The main cause of attenuation in an optical fiber is

a) Resistance and capacitance

b) Scattering and absorption

c) Ideal waveguide

d) Large bandwidth

(68) Which of the following is used as an optical transmitter on the Fiber Optical Communications?

a) APD

b) PIN diode

c) Photo diode

d) LED

(69) In the fiber optic link, power transfer from one fiber to another and from fiber to detector must take place with _____coupling efficiency.

a) maximum

b) stable

c) minimum

d) unpredictable

(70) Which among the following is a key process adopted for the laser beam formation as it undergoes the light amplification?

a) Spontaneous Emission

b) Stimulated Emission

c) Both (a) and (b)

d) None of these