BRAINWARE UNIVERSITY

ODD Semester Examinations 2021- 22

Programme – Bachelor of Technology in Electronics & Communication Engineering - 2018 [B.Tech.(ECE)]

Course Name – Fiber Optic Communications

Course Code – PEC-ECEL702A

(Semester VII)

Time allotted : 1 Hour 25 Minutes   Full Marks : 70

(Multiple choise type question)   70 x 1 = 70

Choose the correct alternative from the following

(I) Kerr nonlinearity is also known as
- A) Third order nonlinearity
- B) Fifth order nonlinearity
- C) Second order nonlinearity
- D) None of these

(II) Type of fiber that has highest modal dispersion is
- A) Single mode step index fiber
- B) Multimode step index fiber
- C) Single mode graded index fiber
- D) Multimode graded index fiber

(III) 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

(IV) Which among the following is/are responsible for generating attenuation of an optical power in fiber?
- A) Absorption
- B) Waveguide effect
- C) Scattering
- D) All of these

(V) Which one of the following is not LED material?
- A) SiO_2
- B) GaAs
- C) GaP
- D) SiC

(VI) Which thing is more dominant in making a fiber function as a bidirectional optical amplifier?
- A) Core material
- B) Pump source
- C) Cladding material
- D) Diameter of fiber

(VII) Attenuation in optical fiber is measured in
- A) dB/Km
- B) dB/br
- C) K dB/m
- D) d Bm/m

(VIII) Which among the following characteristics of Laser light specifies the precise movement of all individual light waves together through time and space?
- A) Monochromatic
- B) Directional
- C) Brightness
- D) Coherent

(IX) 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

(X) 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

(XI) 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

(XII)   The beating between light at different frequencies or wavelengths in multichannel fiber transmission causes _____

    A) Attenuation   B) Amplitude modulation of channels

    C) Phase modulation of channels   D) Loss in transmission

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

    A) Dispersion   B) Scattering

    C) Absorption   D) Attenuation

(XIV)   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

(XV)   Which of the following is used as an optical receiver in fiber optics communications?

    A) APD   B) LED

    C) Tunnel diode   D) Laser diode

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

    A) more than   B) less than

    C) equal to   D) not related with

(XVII)   A silica made optical fiber has a core refractive index of 1.50 and a cladding refractive index 1.47. The critical angle at the core-cladding interface is

    A) 72.5 degree   B) 78.5 degree

    C) 12.5 degree   D) 88.78 degree

(XVIII)   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) Sio_2

(XIX)   Optical bandwidth is always

    A) Greater than the electrical bandwidth   B) Less than the electrical bandwidth

    C) Equal to the electrical bandwidth   D) Square of the electrical bandwidth

(XX)   Effect of Kerr nonlinearity on the performance of directional coupler can be estimated by applying _____.

    A) Finite element method   B) Least square fitting method

    C) Phase shift method   D) Filtering method

(XXI)   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

(XXII)   The material used for fabrication of inner core of an optical fiber is

    A) glass or plastic   B) copper

    C) liquid   D) bimetallic

(XXIII)   Linear scattering effects are _____ in nature.

    A) Elastic   B) Non-Elastic

    C) Mechanical   D) Electrical

(XXIV)   The macroscopic bending losses show an exponential increase due to _____ in radius of curvature.

    A) Increase   B) Decrease

    C) Stability   D) None of these

(XXV)   Which of the following is not related to Kerr effects?

    A) Self-phase modulation   B) Cross-phase modulation

    C) Stimulated Raman Scattering   D) Four-wave mixing

(XXVI)   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

(XXVII)   Single mode optical fiber is mainly used for

A) Long haul communication
B) Short haul communication
C) Medium haul communication
D) None of these

(XXVIII) When the input and output power in an optical fiber is 120micro-W & 3micro-W respectively and the length 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

(XXIX) 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

(XXX) 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
D) None of these

(XXXI) Photonic crystal fibers also called as _____

A) Conventional fibers
B) Dotted fibers
C) Stripped fibers
D) Holey fibers

(XXXII) 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

(XXXIII) The core – cladding refractive index difference of an optical fiber are kept very small in order to minimize

A) Splice loss
B) Bending loss
C) Scattering loss
D) Coupling loss

(XXXIV) Which among the following characteristics of laser light specifies the precise movement of all individual light waves together through time and space?

A) Monochromatic
B) Directional
C) Coherent
D) Brightness

(XXXV) In an optical network, increase in the number of lasers _____ the bit rate.

A) Increases
B) Stabilizes
C) Decreases
D) None of the above

(XXXVI) 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

(XXXVII) Step index fiber sustains only

A) Single mode of propagation
B) multimode of propagation
C) Both (a) and (b)
D) None of these

(XXXVIII) 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

(XXXIX) Which optical devices are adopted or applicable for routing signals from one waveguide to another?

A) Optical Combiner
B) Optical Splitter
C) Optical Coupler
D) None of these

(XL) When three wave components co-propagate at angular frequency w1, w2, w3, then a new wave is generated at frequency w4, which is given by

A) $w4 = w1 - w2 - w3$
B) $w4 = w1 + w2 + w3$
C) $w4 = w1 + w2 - w3$
D) $w4 = w1 - w2 + w3$

(XLI) 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 threshold current

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

A) reflection
B) refraction
C) diffraction
D) dispersion

(XLIII) 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

(XLIV) In spontaneous emission, the light source in an excited state undergoes the transition to a state with _____

A) Higher energy
B) Moderate energy
C) Lower energy
D) All of these

(XLV) In case of dispersion flattened fiber information carrying capacity is increased by using

A) TDM
B) FDM
C) WDM
D) None of these

(XLVI) Which of the following is not an advantage of optical fiber?

A) Low attenuation
B) Large bandwidth
C) Cabling and splicing simplicity
D) Immunity to lightning

(XLVII) In Kerr effect, induced index change has its proportionality with respect to _____

A) square of electric field
B) cube of electric field
C) cube root of electric field
D) one-fourth power of electric field

(XLVIII) During the design of FOC system, which among the following reasons is/are responsible for an extrinsic 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

(XLIX) Which phenomenon causes the dynamic line width broadening under the direct modulation of injection current?

A) Modal noise
B) Mode-partition noise
C) Frequency chirping
D) Reflection Noise

(L) Function of receiver in optical fiber communication is to

A) Reshape the degraded signal
B) Amplify the degraded signal
C) Both amplify and reshape degraded signal
D) None of these

(LI) Graded index fiber provides large bandwidth as well as insignificant sensitivity to _____.

A) Micro and macro bending
B) Back reflection
C) Waveguide dispersion
D) Material dispersion

(LII) LEDs operate correctly when it is_____.

A) Reversed biased
B) Forward biased
C) Both (a) and (b)
D) None of these

(LIII) 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

(LIV) Optical nonlinearity is responsible for _____

A) Broadening of pulses
B) Compression of pulses
C) Both a and b
D) Long repeater spacing communication

(LV) What is different in case of cross-phase modulation from self-phase modulation?

A) Overlapping but same pulses
B) Overlapping but distinguishable pulses
C) Non-overlapping and same pulses
D) Non-overlapping but distinguishable pulses

(LVI) _____ 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

(LVII) Nonlinear effects which are defined by the intensity dependent refractive index of the fiber is called as

A) Scattering effects
B) Kerr effects
C) Raman effects
D) Tomlinson effects

(LVIII)   The wavelength of emitted light in LED depends on

    A) The type of the material   B) Temperature of the surrounding

    C) The energy gap of the material   D) All of these

(LIX)   Maximum dispersion occurs in

    A) Single mode step index fiber   B) Multimode step index fiber

    C) Graded index fiber   D) None of these

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

    A) Single-mode fiber   B) Dual mode fiber

    C) Multimode fiber   D) None of these

(LXI)   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

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

    A) Intramodal   B) Intermodal

    C) Materia   D) Group velocity

(LXIII)   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

(LXIV)   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

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

    A) meridional rays   B) radial rays

    C) helical rays   D) skew rays

(LXVI)   Optical splice provides a connection between

    A) transmitter to fiber   B) receiver to fiber

    C) fiber to fiber   D) fiber to repeater

(LXVII)   A non-coherent light source for optical communications system is _____

    A) LED   B) ILD

    C) PIN Diode   D) APD

(LXVIII)   Photodetector is a

    A) Square law device   B) Linear device

    C) Exponential device   D) None of these

(LXIX)   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

(LXX)   What is/ are the consequence/s of Self Phase Modulation in non-linear optics?

    A) Modification in pulse spectrum   B) Limited transmission rate

    C) Dispersion effect   D) All of the above