JNTU ONLINE EXAMINATIONS [Mid 2 - oc]

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1. The ratio $\left(\frac{n_1 - n}{n_1 + n}\right)$ is known as ____________ , where n,n_1 are refractive index [01D01]
   a. Incidence coefficient
   b. Reflection coefficient
   c. Zero coefficient
   d. Transmission coefficient

2. A Ga As optical source with a refractive index of 3.6 is coupled to a Silica Fiber that has a refractive index of 1.48. If the Fiber end and the source are in close physical contact, then the Fresnel reflection at interface is ______________ [01D02]
   a. 2
   b. 0.25
   c. 0.2
   d. 0.174

3. The emission pattern for a lambertion source _________________relation ship [01M01]
   a. $B((\theta,\varphi) = B_0 \cos\theta$
   b. $B(\theta,\varphi) = B_0 \sin\theta$
   c. $B(\theta,\varphi) = B_0 \tan\theta$
   d. $B(\theta,\varphi) = B_0 \sec\theta$

4. The output beam from a laser diode allows significantly more light to be coupled in to an optical Fiber [01M02]
   a. Bulk
   b. Narrower
   c. Thick
   d. Discontinuous

5. The freshed reflection or the reflectively at the Fiber - core end Face is ______________ [01M03]
   a. $R = \left(\frac{n_1 - n}{n_1 + n}\right)^2$
   b. $R = \left(\frac{n_1 - n}{n_1}\right)^2$
   c. $R = \frac{n_1 - n}{n_1 + n}$
   d. $R = \frac{n_1}{n}$

6. The amount of optical power emitted from a source that can be coupled in to Fiber is usually given by ____________ [01S01]
   a. Normal efficiency
   b. Coupling efficiency
   c. Process of coupling
   d. Fly lead

7. The ratio of power coupled in to the Fiber (P_F) and the power emitted from the light source (Ps) is known as ______________ [01S02]
   a. Efficiency
   b. Fly lead
   c. Coupling efficiency
   d. Coupling

8. _____________ is the optical power radiated in to a unit solid angle per unit emitting surface area [01S03]

a. Radiance
b. Incidence
c. Reflection
d. Transmission

9. Surface emitting L E D'S are characterized by lambertian output pattern, which means the source is equally bright when viewed from any ______________ [01S04]
a. Direction
b. Glass
c. Y, Z direction
d. Incidence

10. ______________ is specified in terms of watts per square centimeter per steradian [01S05]
a. Incidence
b. Reflection
c. Transmission
d. Radiance

11. The number of modes that can propagate in a graded index Fiber of core size a and index profile α is _________ [02D01]
a. $M = \frac{\alpha}{\alpha+2}\left(\frac{2\pi a n_,}{\lambda}\right)^2 \Delta$
b. $M = \frac{\alpha}{2}\left(\frac{2\pi a n_,}{\lambda}\right)^2 \Delta$
c. $M = \alpha^2 \Delta^2 n_,^2$
d. $M = \alpha^2 2\pi a n_,^2 \Delta$

12. The function of __________ is to magnify the emitting area of the source to match exactly the core area of the Fiber end Face [02M01]
a. Micro lens
b. Mirror
c. Operator
d. Fiber

13. The value of reflectivity corresponds to a reflection percentage of the emitted optical power back into the source is given by_____________ equation [02S01]
a. P coupled = (1-R) P emitted
b. P coupled = R P emitted
c. P coupled = P emitted
d. P coupled = R^2 Pemitted

14. ____________ Can be reduced by having an index - matching material between the source and the Fiber end [02S02]
a. Output power
b. Power loss indecibels
c. Power in watts
d. Power loss in watts

15. The optical power launched in to a Fiber depend up on the ____________ of the source [02S03]
a. Wave length
b. Brightness
c. Incidence
d. Reflection

16. The radiated power per mode, $\frac{P_s}{M}$ is given as ___________ [02S04]
a. $B_o \lambda$
b. $B_o \lambda^2$
c. $B_0^2 \lambda^2$
d. $B_0^2 \lambda$

17. Two identically sized sources operating at different wave lengths but having identical radiances will launch ___________ amounts of optical power into the same Fiber [02S05]
   a. Different
   b. Equal
   c. Decreasing
   d. Increasing

18. The degree of mode coupling occuring in a Fiber is primarily a function of ____________ [02S06]
   a. Core -cladding index difference
   b. Coupling
   c. Fiber
   d. Wave length

19. If the emitting area of the source is smaller than the core area , a miniature lens may be placed between the source and the Fiber to improve the _________ [02S07]
   a. coupling
   b. Fiber quality
   c. Wave length
   d. Power coupling efficiency

20. ________________ is most efficient lensing method [02S08]
   a. Lens
   b. Mirror
   c. Non imaging micro scope
   d. Microscope

21. ______________ Separation occurs when the Fibers have the same axis but have a gap between their end Faces [03D01]
   a. Lateral
   b. Angular
   c. Longitidinal
   d. Circular

22. Fiber -to -Fiber coupling loss (L_F) given in terms of Fiber -to -Fiber coupling efficiency (n_F) is _____________ [03M01]
   a. L_F = -1olog n_F
   b. L_F = -20 log n_F
   c. L_F = n_F
   d. L_F = 10 n_F

23. Dash missing offset reduces the common -core area of the two Fiber end Faces [03M02]
   a. Axial
   b. Lateral
   c. Longitidinal
   d. Angular

24. A light source is often supplied with a short Fiber ___________ attached to it in order to Facilifate coupling the source to a system Fiber [03S01]
   a. Fly lead
   b. Cut
   c. Squashed
   d. Convex mirror

25. The best coupling efficiency is achieved by __________ method [03S02]
   a. L E D
   b. lens
   c. Direct - Butt
   d. Microscopic

26. The Fiber to Fiber coupling efficiency is the ratio of common mode volume to __________ [03S03]
   a. Number of modes in the emitting Fiber
   b. Area
   c. Fiber
   d. Fiber cladding

27. The optical power in concentrated at ___________ of the Fiber core [03S04]

a. **Outer**
b. **Inner diameter**
c. **External to Fiber**
d. **Near the center**

28. **___________ losses result from mechanical mis alignments because the radiation core of the emitting Fiber does not match the acceptance cone of the receiving Fiber [03S05]**
a. **Absorption**
b. **Convection**
c. **Radiation**
d. **Conduction**

29. **__________ mis alignment results when the two axes Form an angle so that the Fiber end Faces are no longer parallel [03S06]**
a. **Lateral**
b. **Angular**
c. **Longitidinal**
d. **Axial**

30. **The most common mis alignment which causes the greatest power loss is ______________ [03S07]**
a. **Lateral**
b. **Angular**
c. **Longitidinal**
d. **Axial**

31. **Normal cut off wave length of germanium semiconductor is ___________ [04D01]**
a. **2.86 μ m**
b. **1.6μ m**
c. **3.2μ m**
d. **5.2μm**

32. **The pin photo diode consists of p and n regions separated by a very _____________ doped intrinsic region [04M01]**
a. **Electron**
b. **Lightly n**
c. **Lightly p**
d. **Lightly n&p**

33. **In pin photo diode the time it takes for an electron or hole to recombine is known as___________ [04M02]**
a. **Life time**
b. **Life**
c. **Carrier life time**
d. **Depletion time**

34. **Normal cut off wavelength of silicon semiconductor is ____________ [04M03]**
a. **1.06 μm**
b. **2μm**
c. **1.5μm**
d. **3.2μm**

35. **_________ Senses the luminescent power Falling up on it and converts the variation of this optical power into a correspondingly varying electric current [04S01]**
a. **Photo detector**
b. **Multipliers**
c. **Diodes**
d. **Transistors**

36. **________ Consists a photo cathode and an electron multiplier packaged in a vacuum tube [04S02]**
a. **Photo multiplier**
b. **Multipliers**
c. **Diodes**
d. **Transistors**

37. **Large size and _____________ requirements make them unsuitable for optical Fiber systems [04S03]**

a. Weight
b. High voltage
c. Low gain
d. Low noise

38. Pyro electric photo detectors involve the conversion of _________ to heat [04S04]
a. Electrons
b. Charges
c. Photons
d. Atoms

39. _________ is used almost exclusively for Fiber optic systems because of its small size, suitable material high sensitivity and fast response time [04S05]
a. Electrons
b. Pyroelectric
c. Multipliers
d. Photo diode

40. In Pin - photo detector, the process that general Free electron - hole pairs are called as ____________ [04S06]
a. Diffusion
b. Photo carriers
c. Electrons
d. Ions

41. The units of band gap energy (E_g)of the material is ___________ [04S07]
a. Volts
b. Amperes
c. Watts
d. Electron volts

42. A silicon avalanche photo diode has a Quantum efficiency of 65% at a wave length at 900nm . Suppose 0.5 µw of optical power produces a multiplied photo current of calculate the multiplication M [05D01]
a. 10
b. 20
c. 33
d. 43

43. In a 100ns pulse, $6x10^6$ photons at a wave length of 1300 nm fall on an InGaAS photo detector. on the average, $5.4x10^6$ electron - hole pairs are generated calculate Quantum efficiency [05M01]
a. 10%
b. 60%
c. 50%
d. 90%

44. The carrier multiplication mechanics in Avalanche- photodiodes is known as ___________ [05M02]
a. High energy level
b. Impact Ionization
c. Thermal breakdown
d. Circuit breakdown

45. The average number of electron -hole pairs created by a carrier per unit distance travelled is called as _______________ [05M03]
a. Ionization rate
b. Thermal rate
c. Break down
d. Multiplication rate

46. _________ is the number of the electron - hole carrier pairs generated per incident photon of energy [05S01]
a. Quantum efficiency
b. Electron efficiency
c. Rise time
d. Speed

47. To achieve high quantum efficiency, the ____________ must be thick enough to permit a large fraction of the incident light to be absorbed [05S02]
   a. Deplection layer
   b. Avalanche
   c. Wave length
   d. Quantum

48. The performance of a photo diode is often characterized by the ____________ [05S03]
   a. Deplection layer
   b. Quantum layer
   c. Responsivity
   d. Incident

49. _____________ internally multiply the primary signal photo current before it enters the input circuitry of the following amplifier [05S04]
   a. Pin photo diode
   b. Avalanche photo diode
   c. Diode
   d. Transistor

50. The phenomenon of impact ionization to gaining high energy which is accelerated by the high electric field is __________ [05S05]
   a. Ionization
   b. Avalanche effect
   c. Thermal effect
   d. Break down effect

51. The multiplication (M) for all carriers generated in the photo diode is defined as ___________ [05S06]
   a. $\frac{I_M}{I_p}$
   b. $\frac{1}{I_p}$
   c. M_m
   d. $I_M . I_p$

52. The power signal-to-noise ratio $\frac{S}{N}$ at the output of an optical receiver is defined by _______ [06M01]
   a. $\frac{Signal\ power\ from\ photo\ current}{Photo\ dectector\ noise\ power + amplifier\ noise\ power}$
   b. $\frac{photo\ current}{efficiency + noise}$
   c. $\frac{current}{noise\ power + amplifier\ power}$
   d. $\frac{voltage}{current}$

53. In Fiber optic communication systems, the photo diode is generally required to detect _______ [06S01]
   a. good optical signals
   b. very weak optical signals
   c. high signals
   d. photons

54. The photo detector should have _______ to generate a large signal power [06S02]
   a. low efficiency
   b. current

c. high power
d. high quantum efficiency

55. the photo detector and amplifier noises should be kept as _______ as possible [06S03]
a. high
b. low
c. constant
d. infinte

56. The ________ of a photo detector in an optical fiber communication system is describable in terms of minimum detectable opticalpower [06S04]
a. efficiency
b. output power
c. sensitivity
d. selectivity

57. ________ noise arises from the statistical nature the production and collecion of photo electrons when an signal is incident on a photo detector. [06S05]
a. Quantum
b. Dark current
c. Fluctuations
d. Leakage current

58. The quantum noise current has a mean square value in a bandwidth B which is proportional to the average value of the _______ [06S06]
a. voltage
b. power
c. photo current
d. leakage current

59. The ______ noise is the current of the continuous to flow through the bias circuit of the device when no light is incident on the photodiode [06S07]
a. quantum
b. photodiode dark current
c. fluctuations
d. leakage current

60. The bulk dark current is directly proportional to the _________ [06S08]
a. surface area
b. power
c. current
d. quantum

61. The _______ mechanism of an avalanche photodiode is temperature sensitive [06S09]
a. surface
b. current
c. quantum
d. gain

62. Longer links usually required operation in the _________ wave length region [07D01]
a. 300 nm
b. 400 nm
c. 1300 nm
d. 20, 000 nm

63. The normal wave length range of silicon pin photodiode is ______ [07M01]
a. 100-300 nm
b. 300 nm
c. 400-1100 nm
d. 600-8000 nm

64. The wave length range of Germanium avalanche photodiode is ____ [07M02]
a. 800-1650 nm
b. 300-800 nm
c. 400-1100 nm
d. 500-600 nm

65. The Dark current of Germanium pin photodiode is ________ [07S01]
a. 300-1000 nA

b. 50-500 nA
c. 0-10 nA
d. 300-2000 nA

66. The Band width of InGaAS pin photodiode is _________ [07S02]
a. 10-20 GHZ
b. 6-20 GHZ
c. 1-2 GHZ
d. 0 to 25 GHZ

67. The Band width of Germanium avalanche photodiode is ________ [07S03]
a. 3-100 GHZ
b. 2-10 GHZ
c. 3-80GHZ
d. 50-250 GHZ

68. The rise time for silion pin photodiodes is ______ [07S04]
a. 2-3 ns
b. 0.5-1 ns
c. 10-30 ns
d. 50-100 ns

69. the Bias voltage for InGaAs pin photodiode is ______________ [07S05]
a. 10 V
b. 1000 V
c. 5V
d. 300 V

70. the Bias voltage for Si avalanche photodiodes is ___________ [07S06]
a. 30 V
b. 200 V
c. 150-1000 V
d. 150-400 V

71. For _______ applications, Si devices operaing around 850 nm provide inexpensive solutions for most links [07S07]
a. long distance
b. short distance
c. less gain
d. less voltage

72. Normally for langer links _________ based photo diodes are used [07S08]
a. Si
b. Ge
c. In Ga AS
d. Si Ge

73. The most useful criteria for measuring the performance of a digital communication system is ___________ [08M01]
a. desigin engineer
b. average error probability
c. system design
d. error filtering pattern

74. ________ provides a larger gain factor and a broder band width [08M02]
a. transmitter
b. receiver
c. source
d. optical pre amplifier

75. An ________ consists of a photo detctor, an amplifier and signal processing circuitry [08S01]
a. optical source
b. transmitter
c. optical receiver
d. energy device

76. ________ converts the optical energy from the fiber in to an electrical signal [08S02]
a. conductor
b. electrons

c. photo transistor
d. photo detector

77. Most of the fiber optic systems use a _________ signal [08S03]
a. Analog
b. Two-level binary digital
c. Discrete
d. Non-periodic

78. the transmitted signal is a two-level binary data stream consisting of either a 0 or a 1 in a time slot of duration T_b and this time slot is referred as __________ [08S04]
a. duration
b. bit period
c. Quantum
d. Data line

79. the optical signal that gets coupled from the light source to the fiber becomes attenuated and ______ as it propogates along the fiber wave guide [08S05]
a. simplified
b. binary format
c. distorted
d. linear

80. A decision circuit compares the signal in each time slot with a certain reference voltage known as the ________ level [08S06]
a. zero
b. infinite
c. unknown
d. threshold

81. Optical amplifier is placed a head of the photo diode to ________ the optical signal level before photo detection [08S07]
a. boost
b. lessen
c. zero level
d. introduce noise in

82. Optical amplifier is placed such that _________ degradation caused by thermal noise in the receiver electronics can be suppressed [08S08]
a. gain
b. signal
c. signal to noise ratio
d. input

83. In avalanche photodiode, the additional shot noise arises from ______ [09M01]
a. current
b. avalanche gain
c. voltage
d. power rating

84. Thermal noises are of ______ nature, so they can be readily treated by standard techniques [09M02]
a. Fardays
b. Max wells
c. Gaussian
d. Avalanche

85. The term _________ is used customarily to describe unwanted components of an electrical signal that tend to disturb the transmission [09S01]
a. Signal
b. noise
c. transmitter
d. receiver

86. The noise is caused by the _________ of current or voltage in electric circuits [09S02]
a. Signal
b. Value
c. Spontaneous Fluctuations

d. Receiver

87. _________ noise arises in electronic device because of the discrete natur of current flow in the device [09S03]
a. shot
b. thermal
c. error
d. detectron

88. _______ noise arises from the radom motion of electrons in a conductor [09S04]
a. shot
b. thermal
c. detectron
d. amplifier

89. The random arrival rate of ________ produces a quantum on shot noise in the photo detector [09S05]
a. electrons
b. current
c. signal photons
d. charges

90. _____ photo diode, gives additional shot noise due to statistical nature of the multiplication process [09S06]
a. Pin
b. Avalanche
c. Current
d. Dark current

91. Other than quantum and thermal noise the additional photo detector noises come from the _______ and _______ [09S07]
a. detection, current
b. dark current, thermal current
c. dark current, leakage current
d. bias resistor, dark current

92. _______ noises arising from the detctor load resistor and from the amplifier electronics tend to dominate in applications with low signal to noise ratio when a pin photodiode is used [09S08]
a. thernal
b. quantum
c. bias
d. friction

93. The binary digital pulse train incident on the photo detector can be given as ________ [10D01]
a. $P(t) = \sum_{n=-\alpha}^{\alpha} b_n h_p (t - nT_b)$
b. P(t)= b_n h_p
c. $P(t) = \sum_{n=-\alpha}^{\alpha} b_n h_p$
d. P(t)= e^{-t} sinwt

94. The equalizer in Receiver configuration is a _________ shaping filter [10M01]
a. linear frequency
b. voltage
c. current
d. heat

95. The primary photo current generatd by the photodiode is a ________ poisson's process resulting from the random arrival of photons at the detector [10S01]
a. constant
b. time varying
c. instant
d. fixed time

96. If the detector is illuminated by an optical signal P(t) then the average number of electron-hole

pairs $\bar{N}$ generated in a time z is __________ [10S02]

a. $\frac{\eta E}{h\upsilon}$
b. $\frac{E}{h}$
c. $\frac{E}{g}$
d. $\frac{\eta E}{g}$

97. ____ source error results from pulse spreading in the optical fiber [10S03]
a. Interference
b. Noise
c. Quantum
d. Inter symbol Interference

98. The mean gain for a pin photo diode is ________ [10S04]
a. 0
b. 2
c. 1
d. infinite

99. The amplifying function in a photo diode is represented by the voltage-controlled current source which is characterized by a ________ [10S05]
a. impedance
b. transconductance
c. reactance
d. voltage

100. The input noise current source arises from the ________ of the amplifier input resistance [10S06]
a. quantum
b. speak noise
c. thermal noise
d. wave noise

101. The equalizer in Receiver configuration is used to mitigate the effects of ____ and inter symbol interference [10S07]
a. voltage
b. current
c. signal distortion
d. source

102. In some cases, _________ may be used to correct the electric frequency response of the photo detector and the amplifier [10S08]
a. equalizer
b. transmitter
c. photo detector
d. amplifier

103. The high impedance pre amplifier produces a large input _______ time constant [11D01]
a. R
b. C
c. RC
d. $\frac{R}{C}$

104. typical error rates for optical fiber telecommunication systems range from ______ to _______ [11M01]
a. 10^{3} to 10^{5}
b. 10^{-9} to 10^{-12}

c. 10^{-6} to 10^{8}
d. 10^{-9} to 10^{-25}

105. For unbiased data with equal probability of 1 and 0 occurences, a=b=_____ in error probility [11M02]
a. 1
b. 0.6
c. 0
d. 0.5

106. The ratio of number of errors occuring over a time intervolt by the number of pulses(Nt) transmitted during this interval is ______- [11S01]
a. Bit-error rate
b. Pulses
c. Count
d. Efficiency

107. The error rate depends on ________ at the receiver [11S02]
a. Signal
b. Noise
c. Signal to noise ratio
d. Type

108. To compute the bit error rate at the receiver we have to known the _______ of the signal at the equalizer output [11S03]
a. type
b. probability distribution
c. nolse
d. count

109. If a signal S is the gaussian probability distribution function________ is usd to measure the width of the probability distribution [11S04]
a. variance
b. standard deviation
c. Mean
d. Parabolic

110. The ______ is widely used to specify receiver performance since it is related to the signal-to-noise ratio required to achieve a specific bit-error rate [11S05]
a. error probability
b. φ-parameter
c. variance
d. noise

111. The signal-to-noise ratio at which the transition occur is called the _______- [11S06]
a. Threshold level
b. Inching effect
c. Biasing point
d. Link level

112. The low impedance pre-amplifier do not provide a ________ receiver sensitivity [11S07]
a. low
b. high
c. zero
d. equal

113. The transmitted optical power in the amplitude modulaion form is ________ [12M01]
a. $P(t)=P_t[1+s(t)]$
b. $P(t)=P_t[1+ms(t)]$
c. $P(t)=P_t ms(t)$
d. $P(t)=0$

114. For a Analog receiver, the performance fidelity is measured in terms of a __________ ratio [12S01]
a. Noise
b. Signal-to-Noise
c. Frequency

d. Source

115. Signal to Noise ratio is defined as the ratio of the mean-square signal current to the ________ [12S02]
a. Noise
b. Interference
c. Mean-Square noise current
d. Impulse current

116. Analog technique is to use amplitude modulation of the __________ [12S03]
a. source
b. receiver
c. noise
d. power

117. ________ is the ratio of variation in current about the bias point to the input drive current [12S04]
a. modulation index
b. noise-signal
c. power relation
d. signal current

118. In order not to introduce distortion in to the optical signal, the modulation must be confined to the _______ region [12S05]
a. Bias
b. Linear
c. Unlinear
d. Power

119. In analog receivers, the signal of the photo diode output current and inversely proportional to the _______ of the circuit [12S06]
a. thermal noise
b. source
c. impulse
d. frequrncy

120. For large optical incident on a pin photodiode, the _______ noise associated with the signal detecion process dominates [12S07]
a. quantum
b. bit rate
c. thermal
d. band width

121. When an avalanche photodiode is employed at low signal levels and with low values of gain M. the _______ term dominates [12S08]
a. quantum
b. circuit noise
c. thermal
d. bit-rat

122. For a given set of operating conditions in avalanche photo diode, the optimum value of the avalanche gain, the signal to noise ratio is _____ [12S09]
a. small
b. maximum
c. zero
d. infinite

123. For low signal levels an __________Photodiode yields a higher signal to noise ratio [12S10]
a. Pin
b. Avalanche
c. Pyroelectric
d. Multipliers

124. For large received optical power levels a ______ photo diode gives better performance [12S11]
a. Pin
b. Avalanche
c. Pyroelectric
d. Multiplier

125. The individual frequency signals can be extracted from the combined frequency division multiplexing signal by appropriate _____ at the receiver terminal [13M01]
   a. time sharing
   b. electrical filtering
   c. bands
   d. energy levels

126. __________ multiplexing technique requires an increase in the number of opticl components required within a particular system and therefore has not been widely used [13M02]
   a. frequency division
   b. time division
   c. pulse division
   d. space division

127. The dominant design criteria for a specific application using either digital or analog transmission techniques are ______ and ________ [13S01]
   a. transmission distance, rate of information transfer
   b. distance delay
   c. delay, non periodic
   d. peridic, non periodic

128. In order to maximize the information transfer over an opticl fiber communication link it is usual to ______- serval signals on to a single fiber [13S02]
   a. de multiplex
   b. multiplex
   c. grouped
   d. tied

129. Digital pulse modulation schemes may be extended to multi channel operation by ______ multiplexing [13S03]
   a. Time division
   b. Pulse
   c. Source
   d. Signal receiver

130. In _______ multiplexing the optical channel band width is divided in to a non over lapping bands and each signal is arrigned one of these bands of frequencies [13S04]
   a. Time division
   b. Pulse division
   c. Frequency division
   d. Signal

131. The separation and extration of the multiplexes signals (ie wave length separation) is performed with _________ [13S05]
   a. Optical filters
   b. Suppressors
   c. dividers
   d. Multi channel

132. Multiplexing technique which does not involve the application of several message signls on to single fiber is known as ______ multiplexing [13S06]
   a. source
   b. signal
   c. power
   d. space division

133. In _______ multiplexing each signal channel is carried on a separate fiber with in a fiber bundle [13S07]
   a. frequency division
   b. space division
   c. time division
   d. multi channel

134. The good optical isolation offered by fiber meansd the cross coupling between channels can be made _______ [13S08]
   a. zero
   b. infinite
   c. negligible

d. to increase

135. Two analyses are usually carried out to ensure that the derived system performance can be met by using link power budget and the ________ [14M01]
a. bit-error rate
b. system rise time budget analysis
c. receiver
d. band width

136. If the distance over which the data are to be transmitted is not too far, we may sperate in _________ region [14M02]
a. 500-600 nm
b. 1300-1400 nm
c. 200-300 nm
d. 800-900 nm

137. Pin Photo diodes bias voltages are normally less than ____ volts [14M03]
a. 200
b. 300
c. 5
d. 1

138. The system parameters involved in deciding between the use of an LED and a laserdiode are signal dispersion data rate, _______ and _______ [14M04]
a. transmission distance, cost
b. distance , power
c. power, Fiber thickness
d. losses, speed

139. To increase the end-to end fidelity of an optical transmission line, _________ can be used if the bit-error rate is limited by optical noise and dispersion [14S01]
a. forward error correction
b. slew rate
c. systems
d. signal-to-noise

140. The simplest transmission link is a point-to -point line that has a transmitter on one end and ________ on the other [14S02]
a. point
b. receiver
c. system
d. bandwidth

141. If the transmission distance is long, we may operate in ________ region [14S03]
a. 500-600 nm
b. 1300-1550 nm
c. 200-300 nm
d. 600-800 nm

142. __________ receiver is simpler more stable with changes in temperature, less expensive [14S04]
a. avalanche photodiode
b. pyroelectric
c. pin photo diod
d. photo transistor

143. Avalanche photodiode bias voltages range are normally from _________ V ito several hundread volts [14S05]
a. 5
b. 3
c. 40
d. 20

144. For low optical power levels ________ photo diode is very usefull [14S06]
a. pin
b. avalanche
c. pyroelectric
d. photo transistor

145. **Modal nois is not aproblem for links operating below ____ [15D01]**
- a. **10 Mb/s**
- b. **0.1 Mb/s**
- c. **0.003 Mb/s**
- d. **100 Mb/s**

146. **The link loss expressed in decibels are _____ [15M01]**
- a. **loss=10 log** $\frac{P_{out}}{(Pin)^2}$
- b. **loss=10 log** $\frac{P_{out}}{Pin}$
- c. **loss=** $\frac{P_{out}}{Pin}$
- d. **loss=** $\frac{P_{in}}{Pout}$

147. **The optical power received at the photo detector depends on the amount of light coupled in to the fiber and the occuring in the fiber [15S01]**
- a. **losses**
- b. **output**
- c. **budget**
- d. **link**

148. **A _____ analysis is a convenient method for determining the dispersion limitation of an optical fiber link [15S02]**
- a. **loss**
- b. **power**
- c. **rise-time budget**
- d. **pulse**

149. **The ________ limit depends on material and modal dispersion [15S03]**
- a. **dispersion**
- b. **power**
- c. **loss**
- d. **pulse**

150. **The achievable transmission distances are those that fall below the _____ and to the left of the dispersion line [15S04]**
- a. **dispersion**
- b. **attenuation limit curve**
- c. **pulse**
- d. **material limit**

151. **Greater transmission distances are possible when a Dash is missing is used in conjunction with an avalanche photo diode [15S05]**
- a. **Pin photo diode**
- b. **Transistor**
- c. **Laser diode**
- d. **spectral**

152. **_________ uses a set of rules for arranging the signal symbols in a particular pattern [15S06]**
- a. **single mode links**
- b. **encoding**
- c. **decoding**
- d. **signal encoding**

153. **_______ noise arises when the light from a coherent laser is coupled in to a multimode fiber [15S07]**
- a. **thermal**
- b. **modal**
- c. **mode-partition**
- d. **chirping**

154. **Passive devices operate completely in the optical domain to ____________ and ___________**

light streams [16M01]
a. Split, combine
b. Split, uncombine
c. Zero,one
d. Light,dark

155. The technology of combining a number of wave lengths on to the same Fiber is known as ______________ multi plexing [16S01]
a. Wave length division
b. Pulse division
c. Frequency division
d. Time division

156. Wave length dividion multiplexing is same as _________________ multiplexing [16S02]
a. Pulse division
b. Frequency division
c. Pulse division
d. Time division

157. Wave length division must be properly spaced to avoid____________ [16S03]
a. Noise
b. Thermal
c. Quantum
d. Inter channel Interference

158. The application of wave length division multiplexing is ________________ of existing point -to - point Fiber optic transmission links [16S04]
a. Capacity upgrade
b. Interference
c. Wavelength
d. Capacity decrease

159. ____________ is that each optical channel can carry any transmission Format [16S05]
a. Pulse division
b. Frequency division
c. Wave length division
d. Quantum

160. Wave length division multiplexing is essentially frequency division multiflexing at ___________ frequencies [16S06]
a. Low
b. HIgh
c. Optical carrier
d. channel

161. ___________ wave length division components include tunable optical filters,tunable sources ,and optical amplifiers [16S07]
a. Passive
b. Real
c. Active
d. Inductance

162. To prevent spurious signals from entering a receiving channel, the demultiplexer must exhibit ______________ spectral operation [16S08]
a. Broader
b. Zero
c. Infinite
d. Narrow

163. ____________ components can be fabricated by means of planar optical wave guides using material such as lithium niobate [16S09]
a. Active
b. Passive
c. Lumped
d. Distributed

164. ______________ measures the degree of isolation between the input at one port and the optical power back in to the other input port [17D01]

- a. Splitting
- b. Insertion
- c. Coupler
- d. Cross talk

165. ___________ is define as the ratio of the input to the total output power, in a 2X2 coupler [17D02]

- a. Noise
- b. Quantum
- c. Excess loss
- d. Heat loss

166. Most passive wave length division multiplexing devices are variations of a ___________ concept [17M01]

- a. Normal
- b. Star - coupler
- c. Wind - coupler
- d. Delta - coupler

167. The cross talk optical power equation is given as ____________ [17M02]

- a. $10\log\left(\frac{p_3}{p_0}\right)$
- b. $10\log\left(\frac{p_1}{p_0 + p_3}\right)$
- c. $10\log(p_0 p_3)$
- d. $10\log\left(\frac{p_1}{p_0 - p_3}\right)$

168. The phase of the driven Fiber always ____________ behind the phase of the driving Fiber [17M03]

- a. Leads 90^0
- b. Lags 90^0
- c. Inphase
- d. Lags 180^0

169. The excess loss for a 2×2 coupler is ______________ [17M04]

- a.
- b.
- c.
- d.

170. A common fabrication method for an $N_X N$ splitter is to fuse together the cores of ____________ single mode Fibers over length of a few millimeters [17S01]

- a. (N-1)
- b. (N+2)
- c. (N-2)
- d. N

171. Any size star coupler can be made, in principle, provided that all Fibers can be heated uniformly during the ______ process [17S02]

- a. Heating
- b. Coupler
- c. Coupler- Fabrication
- d. Gain

172. For a NXM coupler, the coupler has ___________ inputs and _______________outputs [17S03]

a. N, M
b. (N-1),(M-1)
c. (N+1),(M+1)
d. (N-1)(M+1)

173. ___________ devices makes the tapers very gradual, so that only a negligible fraction of the incoming optical power is reflected back in to either of the input ports [17S04]
a. Directional couplers
b. Tapered coupler
c. Fused coupler
d. Reverse coupler

174. The ___________loss refers to the loss for a particular port - to - port path [17S05]
a. Excess
b. Splitting
c. Insertion
d. Coupler

175. The attenuation of the cable in decibels by insertion loss method is ____________________ [18D01]
a. $A = 10\log \frac{p_1(\lambda)}{p_2(\lambda)}$
b. $A = \frac{p_1(\lambda)}{p_2(\lambda)}$
c. $A = 10\log p_1(\lambda)\, p_2(\lambda)$
d. $A = \frac{p_1}{p_2}$

176. I$_F$ p$_F$ and P$_n$ respect the output powers of the far and near ends of the Fiber, the average loss α in decibels per kilometer is given by ____________ [18M01]
a. $\alpha = \frac{10}{L}\log\frac{p_N}{p_F}$
b. $\alpha = \frac{p_N}{p_F}$
c. $\alpha = \frac{10}{L}$
d. $\frac{10}{L}\frac{p_N}{P_F}$

177. ____________ of optical power in a Fiber wave guide is a result of bsorption processes, scatlering mechanisms and wave guide effects [18S01]
a. Dispersion
b. Attenuation
c. Line loading
d. Single mode fibers

178. Measuring the optical power transmitted through a long and a short length of the same fiber using identical input couplings method is known as__________ [18S02]
a. Attenuation
b. Cut back technique
c. Coding
d. Analyzer

179. A less accurate but non destrictive method is the ______________ method,which is useful for cables with connectots on them [18S03]
a. Thermal loss
b. Quantum loss

c. Insertionloss
d. Heat loss

180. The ____________ is a destructive method requiring access to both ends of the Fiber [18S04]
a. Attenuation technique
b. Cut back technique
c. Connectors
d. Optical system

181. In_____________ Fiber, different launch conditions can yield different loss values [18S05]
a. Single mode
b. Multi mode
c. Photo detector
d. Madrel wrap

182. In insertion -loss method the launch and detector coupling are made through __________ [18S06]
a. Points
b. Joints
c. Couplers
d. Separation

183. In insertion -loss method,_____________ is the sum of the loss of the cabled Fiber and the connector between the launch connector and the cable [18S07]
a. Measurment
b. Attenuation
c. Wave length
d. Frequency

184. In cut -back technique, if the spot size is small and its numerical operture is less than that of the Fiber core, the optical power is concentrated in the __________of the core [18S08]
a. Side
b. Surface
c. Center
d. Distribution

185. For pulse dispersion the Fiber transfer function must not roll off to less than ____________ of its low frequency value for frequencies up to half the desired bit rate [19M01]
a. 1
b. 0.5
c. 3
d. 4

186. For pulse dispersion, the r.m.s width of the Fiber impulse response must be less than ___________ of the pulse spacing [19M02]
a. Half
b. 3
c. One Quarter
d. 1

187. ____________ produce pulse broadening of light wave signals in optical Fiber, there by limiting the information - carrying capacity [19S01]
a. AQttenuation
b. Dispersion
c. Insertion
d. Cut-back

188. In multimode Fibers _________________ arises from the Fact that each mode in an optical pulse travels a slightly different distance and thus arrives at the Fiber end at slightly off set times [19S02]
a. Inter modal dispersion
b. Intramodal dispersion
c. Chromatic dispersion
d. Polarization

189. __________ sterms from the variation inthe propagation speed of the individual wave length components of an optical signal [19S03]
a. Chromatic dispersion

b. Intermodal dispersion
c. Intramodal dispersion
d. Polarization

190. __________________dispersion arises from the splitting of a polarized signal into orthogonal polarization modes, each of which has a different propagation speed [19S04]
a. chromatic
b. Intermodal
c. Polarization
d. Intramodal dispersion

191. The transfer function of a Fiber optic cable is of importance because it contains ______________ information of the system [19S05]
a. Gain
b. Band width
c. Output pattern
d. Input pattern

192. Chromatic dispersion is the primary dispersive mechansm is __________ Fibers [19S06]
a. Single-mode
b. Multi-mode
c. Co-axial
d. Light

193. _________ is the resulting difference in propagation times between the two orthogonal polarization modes ata given wave length will result in pulse spreading [19S07]
a. Chromatic dispersion
b. Polarization - mode dispersion
c. Phase - shift method
d. Dispersion method

194. ____________occurs when light eners a medium that has a different index of refraction [19S08]
a. Fresnel refletion
b. Dispersion
c. Trace
d. Scatlering

195. The Pseudorandom binary sequence pattern length is of the form _____ [20M01]
a. 2^N
b. (2*N)
c. (2^N-1)
d. $(1-2^N)$

196. _______ in an optical fiber system arises from noise in the receiver and puls distortion in the optical fiber [20M02]
a. noise
b. pattern
c. timing jitter
d. accuracy

197. _______ technique is a simple but power measurement method for assessing the data-handling ability of a digital transmission system [20S01]
a. dispersion
b. eye-pattern
c. error
d. measurement

198. Eye patterns has been usd extensively for evaluating the performance of wire systems and can also be applied to ________ [20S02]
a. eye
b. light
c. optical Fiber data link
d. oscilloscope

199. The eye pattern measurements are made in the _______ and allow the effects of wave form distortion [20S03]
a. Time domain
b. Patterns

c. **Fall time**
d. **reflects**

200. To measure system performance with the eye pattern technique, a varity of __________ should be provided [20S04]
a. **time pattern**
b. **word pattern**
c. **fall time**
d. **reflects**

201. ______ defines the time interval over which the received signal can be sampled with out error from inter symbol interference [20S05]
a. **binary sequence**
b. **width of the eye opening**
c. **interval**
d. **pattern**

202. _____ is the percentage ratio of the peak signal voltage V_1 for an alternating bit sequence to the maximum signal voltage V_2 as measured from the threshold level [20S06]
a. **Jitter**
b. **Noise Margin**
c. **Eye pattern**
d. **Sequence**

203. The rate at which the eye closes as the sampling time is varied (i e the slope of the eye-pattern sides)determines the ________ for the system to timing errors [20S07]
a. **accuracy**
b. **noise**
c. **pattern**
d. **sensitivity**

204. ________- is defined as the time interval betwen the point where the rising edge of the signal reaches 10 percent of its final amplitude [20S08]
a. **fall time**
b. **rise time**
c. **noise**
d. **mid time**