b.	Compare					
	(i)	Step index and graded index fiber	4	3	1	1
	(ii)	Stimulated Raman scattering and stimulated Brillouin scattering	4	3	1	1
	(iii)	Define normalized frequency (or) V-parameter	4	3	1	1
27. a.	Explain the concept of link power budget and rise time budget in detail.		10	4	2	2
	(OR)					
b.	Mention the classification of WDM light wave systems. Explain about them in detail.		10	3	2	3
28. a.	Explain in detail about the Erbium Doped Fiber Amplifier (EDFA) with neat diagram.		10	4	3	1
	(OR)					
b.i.	Define dispersion maps and mention its types. Also, briefly explain the importance of Dispersion Compensating Fibers (DCFs).		6	4	3	1
ii.	Briefly explain about Fiber Bragg gratings (FBGs).		4	3	3	1
29. a.	Describe the basic transmission problems associated with optical wireless transmission. Also, list the possible solutions for the same.		10	3	4	3
	(OR)					
b.	What are the applications of Radio over Fiber Technology? Give a detailed explanation.		10	4	4	1
30. a.	With a neat sketch, explain the concept of Heterogenous Optical Networks (HONs) in detail.		10	3	5	1
	(OR)					
b.	Describe the concept of Visible Light Communication (VLC) in detail. Mention the advantages and applications.		10	3	5	1

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Reg. No.														

B.Tech. DEGREE EXAMINATION, MAY 2022

Seventh Semester

18ECE323T – ADVANCED OPTICAL COMMUNICATION

(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours Max. Marks: 75

	Marks	BL	CO	PO

PART – A (25 × 1 = 25 Marks)

Answer **ALL** Questions

1. In an optical fiber, the concept of numerical aperture is applicable in describing the ability of _____ — 1 1 1 1

(A) Light collection (B) Light scattering
(C) Light dispersion (D) Light polarization

2. The tendency of materials to become compressed in the presence of an electric field is called _____ — 1 1 1 1

(A) Electro refraction (B) Electrostriction
(C) Electro absorption (D) Electro friction

3. For synchronous heterodyne receivers, the bit error rate for QPSK is given as — 1 2 1 3

(A) $\frac{1}{2}erfc\left(\sqrt{SNR}\right)$ (B) $\frac{1}{2}erfc\left(\frac{\sqrt{SNR}}{4}\right)$

(C) $\frac{1}{2}erfc\left(\sqrt{\frac{2}{5}SNR}\right)$ (D) $\frac{1}{2}erfc\left(\frac{\sqrt{SNR}}{2}\right)$

4. When three components co-propagate at angular frequency $\omega_1, \omega_2, \omega_3$ then a new wave is generated at frequency ω_4 , which is given by _____ — 1 2 1 2

(A) $\omega_4 = \omega_1 - \omega_2 - \omega_3$ (B) $\omega_4 = \omega_1 + \omega_2 + \omega_3$
(C) $\omega_4 = \omega_1 + \omega_2 - \omega_3$ (D) $\omega_4 = \omega_1 - \omega_2 + \omega_3$

5. _____leads to a periodic power exchange between the two polarization components. — 1 1 1 1

(A) Birefringence (B) Dispersion
(C) Spot size (D) Confinement factor

6. The rise time of the receiver usually ranges between — 1 2 2 2

(A) 0% and 10% (B) 10% and 90%
(C) 90% and 100% (D) 25% and 50%

7.	The dominant non linear phenomenon that limits the performance of a single WDM channel is _____	1	1	2	1
	(A) Self-phase modulation (B) Stimulated raman scattering (C) Four wave mixing (D) Cross phase modulation				
8.	Telephone networks employ _____topology for distribution of audio channels within a city.	1	1	2	1
	(A) Hub (B) Bus (C) Star (D) Ring				
9.	A multiplexing scheme makes use of spread spectrum technique is referred to as _____	1	2	2	1
	(A) Time division multiplexing (B) Wavelength division multiplexing (C) Code division multiplexing (D) Space division multiplexing				
10.	Which of the following calculation is used to determine the power margin between the optical transmitter output and the minimum receiver sensitivity?	1	2	2	2
	(A) Rise time budget (B) Link power budget (C) Bit error rate calculation (D) Signal to noise ratio calculation				
11.	Which wavelength is the most suitable for pumping an EDFA?	1	1	3	1
	(A) 0.85 μm (B) 0.98μm (C) 1.30μm (D) 1.55μm				
12.	A spectral region over which most of the incident light is back reflected in fiber Bragg gratings is known as _____	1	1	3	1
	(A) Fixed band (B) Attenuated band (C) Stop band (D) Negative band				
13.	The ratio of Raman gain coefficient and cross sectional area of the pump beam inside the fiber is called as _____	1	2	3	3
	(A) Effective length (B) Effective mode area (C) Raman gain efficiency (D) Raman amplification factor				
14.	In dispersion-shifted fibers, the wavelength of zero dispersion is shifted to the region of lowest attenuation, which mostly lies in the _____wavelength region.	1	2	3	2
	(A) 850 nm (B) 980 nm (C) 1300 nm (D) 1550 nm				
15.	If $\overline{n}$ is the refractive index and $\Delta\lambda$ is the grating bandwidth, the expression for grating dispersion is given as	1	2	3	2
	(A) $Dg = \frac{2\overline{n}c}{\Lambda\lambda}$ (B) $Dg = 2\overline{n}\Delta\lambda / c$ (C) $Dg = 2\overline{n} / c\Delta\lambda$ (D) $Dg = 2\overline{n}c\Delta\lambda$				
16.	The cell spectral efficiency is measured in _____	1	1	4	1
	(A) bit/J/s/cell (B) bit/m/Hz/cell (C) bit/s/J/cell (D) bit/s/Hz/cell				

17.	_____is needed in multiuser beam forming since the signals to different users are transmitted in different directions.	1	1	4	1
	(A) Relaying (B) Multihop (C) Precoding (D) Spatial diversity				
18.	_____is a measure of statistical dispersion which indicates the fairness of access in wireless communication system.	1	1	4	1
	(A) Gini coefficient (B) Shannon coefficient (C) Markovian coefficient (D) Gaussian coefficient				
19.	The location where the radio signals are collected and processed is known as	1	1	4	1
	(A) Joint processing unit (B) Processing unit (C) Central processing unit (D) Central unit				
20.	The method for transmitting microwave analog signals over an optical fiber link have become known as _____techniques.	1	1	4	1
	(A) RF-over fiber (B) AF-over fiber (C) Analog modulation (D) Digital modulation				
21.	Nodes which communicate directly with the base station in FSO sensor network system is called _____	1	1	5	1
	(A) Sector nodes (B) Cluster nodes (C) Gateway nodes (D) Open nodes				
22.	The number of nodes within the radio range of a node is called as	1	1	5	1
	(A) Cluster density (B) Node density (C) Cell density (D) Spectral density				
23.	IEEE 802.15.7 standard belongs to _____	1	2	5	1
	(A) WiMax (B) Visible light communication (C) Bluetooth (D) WLAN				
24.	The Ultrawide Band (UWB) communications operating in _____range.	1	2	5	2
	(A) 2.8 GHz -9.4 GHz (B) 3.1 GHz -10.6 GHz (C) 4.8 GHz -11.4 GHz (D) 5 GHz -12 GHz				
25.	The time from when the network begins sensing and transmitting data, until time when network coverage falls to 0% of the total deployed area is called as _____	1	1	5	1
	(A) Network lifetime (B) Node life time (C) Cell lifetime (D) Gateway life time				

PART – B (5 × 10 = 50 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
26. a.	With a neat sketch explain the operation of synchronous and asynchronous heterodyne receiver.	10	3	1	3

(OR)