GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

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Registration No: | | | | | | | | | | |

Total Number of Pages : 2 AR-17 B.TECH

B.TECH 5th SEMESTER EXAMINATIONS, NOV/DEC 2019

BEIPE5041 OPTOELECTRONIC DEVICES AND INSTRUMENTATION

Common to AEI

Time : 3 Hours Maximum : 100 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) 10 x 2=20 Mark

Q.1. Answer *All* Questions

a In Stimulated Emission, which among the following parameters of generated photon is/are similar to the photon of incident wave? [CO1] [PO1]
A. Phase B. Frequency
C. Polarization & direction of travel D. All of the above

b In an optical fiber communication system, which among the following is not a typical transmitter function? [CO1] [PO1]
A. Coding for error protection B. Decoding of input data
C. Electrical to optical conversion D. Recoding to match output standard

c Which category/ies of wavelength division multiplexer comprise/s two 3dB couplers where the splitting of an incident beam takes place into two fiber paths, followed by the recombination with second 3-dB coupler? [CO1] [PO1]
A. Interference filter based devices B. Angular dispersion based devices
C. Mach-Zehnder Interferometers D. All of these

d Which among the following is/are responsible for generating attenuation of an optical power in fiber? [CO2] [PO1]
A. Absorption B. Scattering
C. Waveguide effect D. All of these

e For neglecting the pulse dispersion in the digital systems, the rms width of fiber impulse response must be _____one-quarter of the pulse spacing. [CO2] [PO1]
A. Less than B. Equal to C. Greater than D. None of these

f If a noisy channel has a bandwidth of 4 MHz with signal to noise ratio of about 1, what would be the maximum capacity of the channel? [CO2] [PO1]
A. 2 Mb/sec B. 4 Mb/sec C. 6 Mb/sec D. 8 Mb/sec

g In the structure of fiber optic cable, the refractive index of core is always _____the refractive index of cladding. [CO3] [PO1]
A. Less than B. Equal to C. Greater than D. None of these

h In circulator, an optical path of signal follows _____ [CO4] [PO1]
A. An open loop B. A closed loop C. Both a and b D. None of the above

i Which type of fiber-optic coupler causes the distribution of an optical power from more than two input ports among the several output ports? [CO4] [PO1]
A. Star Coupler B. Tree Coupler
C. X Coupler D. All of the above

j According to frequency response of photo-detector, the modulation frequency at which the output current decreases to _____of peak value. [CO4] [PO1]
A. one-third B. one-fourth C. half D. one-tenth

PART – B: (Short Answer Questions) 10X2=20 Marks

Q.2. Answer *ALL* questions

a Explain the importance of Optoelectronics Devices for Instrumentation. [CO1] [PO1]

b Find the Numerical Aperature for a Graded Index fiber. [CO1] [PO1]

c A step index fiber has a refractive index 1.48 anad 1.46 for core and cladding respectively. Find the Numerical Aperature and Accetance angle of the fiber. [CO1] [PO1]

d	What is Group velocity Dispersion?	[CO2] [PO1]
e	What is the Value of Normalized frequency parameter for a single mode fiber? Give relation of it with core radius of fiber.	[CO2] [PO1]
f	Why silicon is not used for generation of light?	[CO3] [PO1]
g	What do you mean by optical communication windows? Write their wavelength.	[CO3] [PO1]
h	The loss characteristics of a fiber is 2.0 dB/Km. Find the power of a communication system that uses a 20 Km of fiber with input power of 100mW.	[CO4] [PO1]
i	What is the internal quantum efficiency of an LED?	[CO4] [PO1]
j	Draw the circuit diagram of a *p*-*i*-*n* detector.	[CO4] [PO1]

PART – C: (Long Answer Questions) 4X15=60 Marks

Answer *ALL* questions

Q.3			
a	Discuss about the types dispersion in fiber in detail.	7	[CO1] [PO2]
b	Discuss the types of attenuations that leads to losses of signal in fiber.	8	[CO1] [PO2]
	OR		
c	Discuss about the fiber types and the structure of each fibers.	10	[CO1] [PO2]
d	What is dispersion flattened fibers? Why and how these are used?	5	[CO1] [PO2]
Q.4			
a	What is lasing? Explain Laser action with the help of 3 and 4 level energy level diagram	10	[CO2] [PO2]
b	Differentiate between spontaneous and stimulated Emission.	5	[CO2] [PO2]
	OR		
c	Explain the structure of LED with a suitable Diagram.	7	[CO2] [PO2]
d	Discuss in detail of operation of LED with expression of Quantum efficiency.	8	[CO2] [PO2]
Q.5			
a	Derive the expression for noise in Optoelectronics detectors.	10	[CO3] [PO2]
b	Explain the structure with suitable diagram of RAPD.	5	[CO3] [PO2]
	OR		
c	Explain structure of PN and PIN Photo Diode with suitable Diagram.	7	[CO3] [PO2]
d	Briefly describe the principle of pressure & flow measurement using opto electronic instrumentation.	8	[CO4] [PO2]
Q.6			
a	What is Optical Amplification? Write Names of Optical Amplifiers. Discuss in detail the working of EDFA.	10	[CO4] [PO2]
b	Write short notes on circulators.	5	[CO4] [PO2]
	OR		
c	Discuss about the modulation techniques used by the Optoelectronic Instruments with suitable Examples.	10	[CO4] [PO2]
d	Write short notes on Acousto-optic modulators.	5	[CO4] [PO2]

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