Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

EC3EL06 / EI3EL06 Optical Networks

Programme: B.Tech. Branch/Specialisation: EC/EI

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Optical Communication based on the principle of **1**

(a) Total internal Reflection (b) Refraction

(c) Diffraction (d) Interference

ii. What is the full-form of WDM with respect to optical networks? **1**

(a) Wireless Digital Multiplexing

(b) Wavelength Division Multiplexing

(c) Wide Division Multiplexing

(d) Wavelength Digital Multiplexing

iii. In an optical network increase in the number of Laser, _____ the bit rate **1**

(a) Increases (b) Stabilizes (c) Decreases (d) None of these

iv. When an optical signal is incident on a photo-detector, which noise originate/s due to statistical nature of production and collection of photoelectrons? **1**

(a) Dark Current Noise

(b) Quantum Noise

(c) Surface Leakage Current noise

(d) All of these

v. How many techniques of implementation are there for routing wavelength assignment (RWA)? **1**

(a) Two (b) Six (c) Three (d) Four

vi. SONET stands for **1**

(a) Synchronous optical network

(b) Synchronous operational network

(c) Stream optical network

(d) Shell operational network

P.T.O.

vii. Which of the following is used to provide wavelength signal service among the nodes? **1**
(a) Regularization (b) Optical enhancing
(c) Hopping (d) Pulse breakdown

viii. Static RWA problem is also known as _____ **1**
(a) Routing problem
(b) Virtual topology problem
(c) Static wavelength problem
(d) Light path problem

ix. WDM is an analog multiplexing technique to combine **1**
(a) Magnetic signals (b) Electromagnetic signals
(c) Digital signals (d) Optical signals

x. When two waves are in phase, they interfere **1**
(a) Constructively (b) Destructively
(c) Linearly (d) Intermediately

Q.2 i. A glass fiber is made with core glass of refractive index 1.5 and cladding is doped to give a fractional index difference of 0.0005. Find: **4**
(a) Cladding Refractive index
(b) Critical Internal Reflection angle
(c) External Critical Acceptance angle
(d) Numerical Aperture

ii. Define NA. An optical fiber has a NA of 0.2 and cladding refractive index of 1.59. Determine the acceptance angle for fiber in water which has a refractive index of 1.33? **6**

OR iii. Discuss briefly about multiplexing techniques in Optical Networks? **6**

Q.3 Attempt any two:

i. Write a short note on Couplers. **5**

ii. Write a short note on Isolators. **5**

iii. Write a short note on Circulators. **5**

Q.4 Attempt any two:

i. Explain elements of a SONET infrastructures with different SONET configuration? **5**

ii. What are the QoS parameters for Optical Networks. Explain? **5**

iii. Discuss briefly about Optical Multicast routing? **5**

Q.5 Attempt any two:

i. Classify different RWA algorithm and explain any one of them? **5**

ii. Explain Wavelength reuse reliability? **5**

iii. What are different restoration schemes. Explain? **5**

Q.6 i. Write a short note on cost trade offs? **4**

ii. Explain the distinguishing features of Optical Switching and Optical Wavelength Routing. With the help of block diagram outline the optical network hierarchy for the public telecommunication network? **6**

OR iii. Why dimensioning models used? Explain statistical and maximum load dimensioning models. **6**

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Marking Scheme
EC3EL06 / EI3EL06 Optical Networks

Q.1	i.	Optical Communication based on the principle of (a) Total internal Reflection		**1**
	ii.	What is the full-form of WDM with respect to optical networks? (b) Wavelength Division Multiplexing		**1**
	iii.	In an optical network increase in the number of Laser, _____ the bit rate (a) Increases		**1**
	iv.	When an optical signal is incident on a photo-detector, which noise originate/s due to statistical nature of production and collection of photoelectrons? (b) Quantum Noise		**1**
	v.	How many techniques of implementation are there for routing wavelength assignment (RWA)? (a) Two		**1**
	vi.	SONET stands for (a) Synchronous optical network		**1**
	vii.	Which of the following is used to provide wavelength signal service among the nodes? (c) Hopping		**1**
	viii.	Static RWA problem is also known as _____ (b) Virtual topology problem		**1**
	ix.	WDM is an analog multiplexing technique to combine (d) Optical signals		**1**
	x.	When two waves are in phase, they interfere (a) Constructively		**1**
Q.2	i.	(a) Cladding Refractive index	1 mark	**4**
		(b) Critical Internal Reflection angle	1 mark	
		(c) External Critical Acceptance angle	1 mark	
		(d) Numerical Aperture	1 mark	
	ii.	Definition of NA	2 marks	**6**
		Determine the acceptance angle for fiber in water	4 marks	
OR	iii.	Multiplexing techniques in Optical Networks Stepwise Marking		**6**
Q.3		Attempt any two:		
	i.	Couplers.		**5**
		Diagram	1 mark	
		Explanation	4 marks	
	ii.	Write a short note on Isolators.		**5**
		Diagram	1 mark	
		Explanation	4 marks	
	iii.	Write a short note on Circulators.		**5**
		Diagram	1 mark	
		Explanation	4 marks	
Q.4		Attempt any two:		
	i.	Elements of a SONET infrastructures	3 marks	**5**
		SONET configuration	2 marks	
	ii.	QoS parameters for Optical Networks Stepwise Marking		**5**
	iii.	Optical Multicast routing Stepwise Marking		**5**
Q.5		Attempt any two:		
	i.	Classification of RWA algorithm	2 marks	**5**
		Explanation of any one of them	3 marks	
	ii.	Wavelength reuse reliability Stepwise Marking		**5**
	iii.	Restoration schemes		**5**
		Classification	2 marks	
		Explanation	3 marks	
Q.6	i.	Cost trade offs		**4**
	ii.	Distinguishing features of Optical Switching and Optical Wavelength Routing.	2 marks	**6**
		Block diagram outline the optical network hierarchy for the public telecommunication network	4 marks	
OR	iii.	Dimensioning models used	2 marks	**6**
		Statistical load dimensioning models	2 marks	
		Maximum load dimensioning models	2 marks	

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