USN | | | | | | | | | | |

Internal Assessment Test I – March. 2019

Sub:	FIBER OPTICS & NETWORKS					Sub Code:	15EC82	Branch:	TCE	
Date:		Duration:	90 min's	Max Marks:	50	Sem / Sec:	8th		OBE	

Answer any FIVE FULL Questions

		MARKS	CO	RBT
1.	Summarize the inherent advantages of optical fiber communication over conventional copper cables.	[10]	CO1	L1
2.	Using ray theory explains propagation of light inside the optical fiber.	[10]	CO1	L1
3. (a)	Differentiate phase & group velocity. Draw neat diagram.	[06]	CO1	L2
(b)	Explain mode field diameter.	[04]	CO1	L4
4 .	Derive expression for N.A. for skew ray.	[10]	CO1	L2
5.	A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.5 and cladding r.i. of 1.47.Determine a) critical angle b) Numerical aperture c) acceptance angle.	[10]	CO1	L2
6.	A graded index fiber has a core with a parabolic refractive index profile which has a diameter of 50μm.The fiber has N.A. of 02.Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of 1μm.	[10]	CO1	L4
7.	Explain various types of scattering losses in optical fiber.	[10]	CO1	L2

USN | | | | | | | | | | |

Internal Assessment Test I – March. 2019

Sub:	FIBER OPTICS & NETWORKS					Sub Code:	15EC82	Branch:	TCE	
Date:		Duration:	90 min's	Max Marks:	50	Sem / Sec:	8th		OBE	

Answer any FIVE FULL Questions

		MARKS	CO	RBT
1.	Summarize the inherent advantages of optical fiber communication over conventional copper cables.	[10]	CO1	L1
2.	Using ray theory explains propagation of light inside the optical fiber.	[10]	CO1	L1
3. (a)	Differentiate phase & group velocity. Draw neat diagram.	[06]	CO1	L2
(b)	Explain mode field diameter.	[04]	CO1	L4
4 .	Derive expression for N.A. for a meridonial ray.	[10]	CO1	L2
5.	A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.5 and cladding r.i. of 1.47.Determine a) critical angle b) Numerical aperture c) acceptance angle.	[10]	CO1	L2
6.	A graded index fiber has a core with a parabolic refractive index profile which has a diameter of 50μm.The fiber has N.A. of 02.Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of 1μm.	[10]	CO1	L4
7.	Explain various types of scattering losses in optical fiber.	[10]	CO1	L2

Scheme of Evaluation Test I – March. 2019

FIBER OPTICS & NETWORKS	Sub Code:	15EC82	Branch:	TCE (8th Sem)

1. **Advantages over conventional Cu cables** (10 marks -1 marks for each point)

a)Enormous potential BW
b)Small size & weight
c)Electrical isolation
d) Immunity to interference & crosstalk
e)signal security
f)low transmission loss
g)Flexibility
h)System reliability
i)potential low cost

2. **Ray theory of transmission**

1)Total internal reflection
a)Refractive index (2 marks)
b)Snell's law (2marks)
c)Diagram of TIR (2 marks)
d) Relationship with angle of incidence (2 marks)
e)critical angle (2 marks)

3.a**)Definition of phase velocity** (1 marks)
Equation of $V_p=\frac{w}{\beta}$ & diagram (2 marks)
Definition of group velocity (1 marks)
Equation of $V_g=\frac{dw}{d\beta}$ & diagram (2 marks)

b) **Definition & Diagram of MFD** (2 marks)
Equation MFD=2w (2 marks)

4. Meridonial ray geometrical diagram (3 marks)
Derivation
a)Proof of snell's law (5 marks)
b) Solution for final expression (2 marks)

5. a)φ_c = 78.5 degree (4 marks)

b) N.A. =0.30 (4 marks)

c) Θ_a -17.4 degree (2 marks)

6. **v**=31.4 (5 marks)

Mg=247 modes (5 marks)

7. **Scattering Losses**

1.Linear a)Rayleigh Scattering b)Mie Scattering (5 marks)

2.Nonlinear a)SBS b) SRS (5 marks)