



Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

**Subject: -Optical Network & Satellite Communication
(22647)**



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SYLLABUS

Chapter No.	Name of chapter	Marks With Option
1	Fundamentals of fiber optic communication	14
2	Optical losses	18
3	Optical network	14
4	Overview of satellite systems	30
5	Satellite segments and services	28
Total Marks :-		104

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SAMPLE QUESTION PAPER

Q.1	Attempt any FIVE	5*2=10
a)	Draw the construction of fiber optic cable	
b)	List any four types of losses in optical fiber	
c)	State the application of optical network	
d)	Define terms: (i) Latitude (ii) Longitude	
e)	List the antenna tracking methods used in radar system	
f)	Define critical angle. State snells law	
g)	State four advantages of geo-stationary satellite	
Q.2	Attempt any THREE	3*4=12
a)	Draw & explain the architecture of SONET/SDH	
b)	Compare step index fiber and graded index fiber	
c)	Draw & explain global positioning system in satellite	
d)	Draw and explain the working principle of GPS Transmitter	
Q.3	Attempt any THREE	3*4=12
a)	Describe the concept of earth segment and space segment	
b)	Write a short note on optical amplifiers	
c)	Draw & explain the optical fiber communication system list advantages and disadvantages	
d)	Why is the uplink is more than downlink frequency in satellite communication	
Q.4	Attempt any FOUR	3*4=12
a)	Describe any two types of losses in space	
b)	Draw block diagram of OTDR & explain its working	
c)	Explain the advantages and disadvantages of optical fiber	
d)	Explain the concept of WDM	
e)	Draw block diagram of satellite subsystem and describe function of each sections	
Q.5	Attempt any TWO	2*6=12

	a)	Explain 1.total internal reflection 2.snells law 3. Critical angle
	b)	Explain the effects of non-spherical earth, atmospheric drag, and eclipse on satellite motion
	c)	Draw the block diagram of telemetry tracking and command subsystem and state its principle of operation
Q.6		Attempt any TWO 2*6=12
	a)	How power is generated in satellite? Describe how it is distributed to other subsystem of satellite.
	b)	Describe the working principle of MEO & draw the characteristics of various field
	c)	Write uplink and downlink frequencies for C-Band, X-Band, and Kn-Band & Ka-Band.



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CLASS TEST - I

PAPER PATTERN

Syllabus:-

Unit No.	Name of the Unit	Course Outcome (CO)
1	Fundamentals of fiber optic communication	CO-647.1
2	Optical losses	CO-647.2
3	Optical network	CO-647.3

Q.1	Attempt any FOUR 4*2=8Marks	Course Outcome (CO)
a)	State the use of optical network	CO-647.3
b)	Define critical angle. State snells law	CO-647.2
c)	List the application of optical fiber	CO-647.1
d)	State the laws of reflection.	CO-647.2
e)	Classify the fiber optic cable	CO-647.1
f)	Draw the diagram of fusion splice	CO-647.2
Q.2	Attempt any THREE 3*4=12 Marks	
a)	Explain the working principle of LED as a light source & state its types.	CO-647.1
b)	Draw block diagram of OTDR & explain its working	CO-647.2
c)	Draw & explain the optical fiber communication system	CO-647.1
d)	Differentiate between fusion splicing & v-groove splicing	CO-647.2
e)	Describe the working principle of optical network components	CO-647.3
f)	State and explain the characteristics of optical fiber	CO-647.2

CLASS TEST - II PAPER PATTERN

Syllabus:-

Unit No.	Name of the Unit	Course Outcome (CO)
3	Optical network	CO-647.3
4	Overview of satellite systems	CO-647.4
5	Satellite segments and services	CO-647.5

Q.1	Attempt any FOUR 4*2=8Marks	Course Outcome (CO)
a)	State the application of optical amplifiers.	CO-647.3
b)	Define following terms (i) Foot print (ii) Azimuth angle	CO-647.4
c)	State the application of Satellite communication	CO-647.5
d)	What are the types of satellite?	CO-647.4
e)	Draw block diagram of satellite subsystem	CO-647.5
f)	Define optical network. State its need.	CO-647.3
Q.2	Attempt any THREE 3*4=12 Marks	Course Outcome (CO)
a)	Explain the optical network standards	CO-647.3
b)	Draw and explain the block diagram of power subsystem	CO-647.5
c)	Describe the concept of earth segment and space segment	CO-647.4
d)	Explain the Keplers law of planetary motion	CO-647.4
e)	Explain the working of GPS Receiver with block diagram	CO-647.5
f)	What do you mean by geostationary satellite communication system?	CO-647.4

COURSE OUTCOME (CO)

COURSE: -Optical Network & Satellite Communication

PROGRAMME: - EJ

CO.NO	Course Outcome
CO-647.1	Interpret the function of various block of optical fiber communication system.
CO-647.2	Measure the optical fiber cable parameters
CO-647.3	Select relevant architecture of optical networks for the given application
CO-647.4	Select Uplink and Downlink frequencies for various satellite services
CO-647.5	Maintain satellite services

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Unit Wise Question Bank

Unit -1 Fundamentals of fiber optic communication

1. Classify the fiber optic cable.
2. State the advantages and disadvantages of optical fiber
3. Draw the construction of fiber optic cable.
4. Explain the importance of optical fiber
5. Draw & explain the optical fiber communication system list advantages and disadvantages.
6. Explain the working principle of LED as a light source & state its types.
7. Compare step index fiber and graded index fiber
8. Explain the working principle of optical detector
9. List the application of optical fiber
10. State & explain the characteristics of optical fiber
11. Draw the electromagnetic spectrum.
12. Define Optical Communication.
13. Define modes of propagation.
14. Explain the construction and operation of PIN photodiode.
15. Explain the construction and operation of APD.

Unit -2 Optical Losses

1. Define 1.reflection 2.refraction
2. List any four types of losses in optical fiber
3. Explain 1.total internal reflection 2.snells law 3. Critical angle
4. Define numerical aperture, acceptance angle, acceptance cone
5. List losses of optical fiber. Explain any one
6. Describe the different types of optical fiber losses
7. Define critical angle. State snells law
8. List and explain the properties of splicing
9. Differentiate between fusion splicing & v-groove splicing
10. State and explain the characteristics of optical fiber
11. Draw block diagram of OTDR & explain its working
12. Draw the diagram of fusion splice and rigid alignment tube splice.
13. State the laws of reflection.
14. Write the statements of Snells law.
15. Describe the stepwise procedure for the fusion splicing.
16. Explain the steps for mechanical splice.

17. Write a short note on absorption losses.
18. State the application of OTDR.

Unit -3 Optical Network

1. Write a short note on optical amplifiers.
2. Explain the concept of WDM
3. Define WDM & list the features of WDM
4. State the use of optical network
5. Write a short note on SONET.
6. Draw & explain the architecture of SONET.
7. State the specifications of 802.3j
8. Explain the Ethernet standards optical network.
9. Define optical network. State its need.
10. Describe with neat diagram optical network elements
11. State the application of optical amplifiers.
12. Define the optical splitter. State its types.
13. State the application of splitter.
14. Write a short note on optical switches.

Unit -4 Overview of satellite systems

1. Explain the following terms w.r.t. satellite: (i) Elevation, (ii) Altitude
2. Define and explain the terms: (i) Uplink frequency (ii) Downlink frequency
3. Why is the uplink is more than downlink frequency in satellite communication?
4. Write uplink and downlink frequencies for C-Band, X-Band, and Ku-Band & Ka-Band.
5. Define following terms w.r.t. satellite: (i) Foot print (ii) Azimuth angle
6. Explain the working principle of active and passive satellite
7. Describe the concept of earth segment and space segment
8. Define and explain the terms: (i) Latitude (ii) Longitude
9. What do you mean by geostationary satellite communication system?
10. Explain the working principle of GEO Satellite
11. Write a short note on MEO.
12. Explain the Kepler's law of planetary motion
13. Explain the effects of non-spherical earth, atmospheric drag, and eclipse on satellite motion
14. Draw & explain the working principle of LEO Satellite
15. State four advantages of geo-stationary satellite.
16. What are the types of satellite?
17. Explain the concept of station keeping.
18. Explain look angle with neat diagram.

Unit -5 Satellite segments and services

1. Describe the function of Altitude Control Subsystem in Satellite for keeping satellite in its orbit.
2. Draw block diagram of satellite subsystem and describe function of each sections.
3. Describe the function of telemetry and tracking in satellite communication system.
4. Explain advantages of Satellite communication
5. Illustrate how telemetry tracking and command system is used in satellite.
6. How power is generated in satellite? Describe how it is distributed to other subsystem of satellite.
7. List the antenna tracking methods used in radar system. Explain any one of them.
8. Draw the block diagram of telemetry tracking and command subsystem and state its principle of operation.
9. Draw the block diagram of communication channel subsystem and state its principle of operation.
10. Describe the antenna subsystem of satellite.
11. Draw and explain the block diagram of power subsystem.
12. Describe any two types of losses in space
13. Describe the transmission losses (any two)
14. Explain the antenna misalignment losses and atmospheric losses
15. Draw & explain global positioning system in satellite
16. Draw and explain the working principle of GPS Transmitter.
17. Explain the working of GPS Receiver with block diagram
18. Describe the working of VSAT Architecture with applications