**Unit –V**

**Optical Networks**

**Session input 1**

**SubTopic:Recap:Fiber Diameter Measurement**

**Suggested Activity: Question and answering**

The students are asked questions randomly.Upto 5 questions were asked to them. The questions asked were as follows

* What is meant by Mode Field Diameter?
* What is the necessity for measuring fiber diameter?.

**SubTopic::Introduction to optical networks**

**Suggested Activity: Chalk and Talk**

After remembering the computer networks, it would be appropriate to let the learners to know the basic optical networks. Then advantages of the networks are discussed.

**SubTopic: Optical Network Concept**

**Suggested Activity: Slide Representation**

The various optical network topologies and its advantage and disadvantage are discussed like star topology, mesh topology and bus topology.

**SubTopic: Optical node and switching element**

**Suggested Activity: Slide Representation**

The terms used in optical networks were discussed.

**SubTopic: Conclusion**

**Suggested Activity:Conclusion and Summary**

The basic networks of optical networks are summarized.

<http://compnetworking.about.com/cs/sonet/g/bldef_sonet.htm>

<http://en.wikipedia.org/wiki/Synchronous_optical_networking>

<http://search.globososo.com/web/?q=SONET+NETWORK+TOPOLOGY+PPT&hl=in>

<http://books.google.co.in/books/about/Fiber_Optic_Measurement_Techniques.html?id=4Ga2ioaf48cC&redir_esc=y>

<http://search.globososo.com/web/?q=SONET+NETWORK+TOPOLOGY+PPT&hl=in>

**Session input 2**

**SubTopic:Recap:Optical Networks**

**Suggested Activity: Question and answering**

The students are asked questions randomly.Upto 5 questions were asked to them. The questions asked were as follows

* What are the topologies used for optical networks?
* What are the advantage and disadvantages of bus topology?.

**SubTopic::Introduction to SONET/SDH**

**Suggested Activity: Chalk and Talk**

After remembering the optical networks, introduction about SONET and SDH is explained. The Ethernet concept also explained.

**SubTopic: Basic SONET Frame**

**Suggested Activity: Slide Representation**

The frame structure for SONET is explained. The various basic signals were explained. The various overheads were o explained

**SubTopic: Comparison of SONET/SDH**

**Suggested Activity: Chalk and talk**

The similarities and differences were explained with a tabulation.

**SubTopic: Conclusion**

**Suggested Activity:Brain storming**

TheSonet frame with different level is explained and STM-4 frame format is asked to develop.Students come with various doubts to frame it and their doubts were solved.

<http://www.doc.ic.ac.uk/~nd/surprise_96/journal/vol2/dm9/article2.html>

<http://search.globososo.com/web/?q=SONET+NETWORK+TOPOLOGY+PPT&hl=in>

<http://search.globososo.com/web/?q=SONET+NETWORK+TOPOLOGY+PPT&hl=in>

**Session input 3**

**SubTopic:Recap:SONET /SDH Networks**

**Suggested Activity: Question and answering**

The students are asked questions randomly.Upto 5 questions were asked to them. The questions asked were as follows

* What is the abbreviation for SONET?
* What is the use of path Overhead?

**SubTopic: SONET/SDH ring architecture**

**Suggested Activity: Slide Representation**

* The sonet ring architecture using UPSR and BLSR are explained with example circuit like node failure and cable failure .Then the drawbacks are explained

**SubTopic::Broadcast and Select WDM Networks**

**Suggested Activity: Slide representation**

* The advantages of WDM network is explained. Then the types of WDM networks are explained. The broadcast and select WDM networks are explained with its types.The single hop and multihop is explained with examples.

**SubTopic: Conclusion**

**Suggested Activity:Summarize**

The SONET/SDH rings and WDM networks are summarized**.** <http://www.doc.ic.ac.uk/~nd/surprise_96/journal/vol2/dm9/article2.html>

<http://search.globososo.com/web/?q=SONET+NETWORK+TOPOLOGY+PPT&hl=in>

**Session input 4**

**SubTopic:Recap:Broadcast and select WDM networks**

**Suggested Activity: Question and answering**

The students are asked questions randomly.Upto 5 questions were asked to them. The questions asked were as follows

* What is meant by Mode Field Diameter?
* What is the necessity for measuring fiber diameter?.

**SubTopic::Wavelength routed networks**

**Suggested Activity: Slide representation**

The drawback in broadcast and WDM networks is eliminated in wavelength routed networks by the folloing methods Wavelength reuse,wavelength converter.

**SubTopic: Optical crossconnect**

**Suggested Activity: Slide Representation**

The optical cross connect method is explained with neat block diagram.Its advantage and disadvantage is explained.

**SubTopic: Conclusion**

**Suggested Activity:Question and answer**

What are the advantages of wavelength routed networks?

What are the advantage and disadvantage of optical cross connect?

Give the methods adopted in wavelength roted networks..

<http://search.globososo.com/web/?q=SONET+NETWORK+TOPOLOGY+PPT&hl=in>

**Session input 5**

**SubTopic:Recap:Optical Networks**

**Suggested Activity: Question and answering**

The students are asked questions randomly.Upto 5 questions were asked to them. The questions asked were as follows

* What are the types of SONET WDM networks used for optical networks?
* What are the advantage of WDM technique?
* What are the drawbacks eliminated in wavelength routed networks?
* What are the advantage of multihop compared with single hop?.

**SubTopic::Introduction to Non linear effects on network performance**

**Suggested Activity: Slide reprsentation**

The possibilities of signal impairments are discussed while travelling through a network.

**SubTopic: Non linear scattering due to scattering**

**Suggested Activity: Visualizaion**

The effects and consequences of ,SBS,SRS is explained with diagrammatically.

**SubTopic: conclusion**

**Suggested Activity: Summary**

The various effects are discussed with its consequences

<http://www.powershow.com/view/1bba7-OTA2M/Nonlinear_optics_powerpoint_ppt_presentation>

**Session input 6**

**SubTopic:Recap: non linear effect on Network performance**

**Suggested Activity: Question and answering**

The students are asked questions randomly.Upto 5 questions were asked to them. The questions asked were as follows

* What is known as kerr effect?
* What are the effects occur in single channel?
* What are the impairments occur in multichannel?
* Define Self phase modulation and cross phase modulation
* What is meant by four wave mixing?.

**SubTopic::Introdction to solitons**

**Suggested Activity: Video clippings**

The soliton fundamentals are explained with an example showing the wave created in the water.

**SubTopicSoliton parameters**

**Suggested Activity: Slide Representation**

The various parameters of soliton were explained.

**SubTopic: conclusion**

**Suggested Activity: Summary**

The various parameters were discussed at once.

<http://www.powershow.com/view/1bba7-OTA2M/Nonlinear_optics_powerpoint_ppt_presentation>

<http://www.youtube.com/watch?v=MADng1fqECY>

**Session input 7**

**SubTopic:Recap:Optical Networks**

**Suggested Activity: Question and answering**

The students are asked questions randomly.Upto 5 questions were asked to them. The questions asked were as follows

* What are the types of SONET WDM networks used for optical networks?
* What are the advantage of WDM technique?
* What are the drawbacks eliminated in wavelength routed networks?
* What are the advantage of multihop compared with single hop?.

**SubTopic::Introduction to Non linear effects on network performance**

**Suggested Activity: Slide reprsentation**

The possibilities of signal impairments are discussed while travelling through a network due to kerr effect is explained in detail

**SubTopic: Non linear scattering and Kerr effect**

**Suggested Activity: Slide Representation**

The effects and consequences of Self phase modulation,cross phase modulation,in single mode and multimode is explained and four wave mixing is explained.

**SubTopic: conclusion**

**Suggested Activity: Summary**

The various effects are discussed with its consequences

<http://www.powershow.com/view/1bba7-OTA2M/Nonlinear_optics_powerpoint_ppt_presentation>

**Session input 8**

**SubTopic:Recap:Optical Networks**

**Suggested Activity: Quiz**

The students are made into 4 teams and questions were asked to each team.Upto 5 questions were asked to them. The questions asked were as follows

* What are the types of SONET WDM networks used for optical networks?
* What are the advantage of WDM technique?
* What are the drawbacks eliminated in wavelength routed networks?
* What are the advantage of multihop compared with single hop?.
* What is called soliton ?
* Enumerate the layers of SONET?SDH.
* What are the effects used in soliton?
* How to avoid contention in optical cross connect?

**SubTopic::Optical CDMA**

**Suggested Activity: Slide reprsentation**

The concept of optical CDMA was explained.Tha advantages are also explained

**SubTopic:ltra high capacity Networks**

**Suggested Activity: chalk and talk**

The ultra high capacity networks are explained

**SubTopic: conclusion**

**Suggested Activity: Summary**

The various effects are discussed with its consequences

http://www.ee.buffalo.edu/faculty/paololiu/566/op\_cdma.

<http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470>...

http://sierra.ece.ucdavis.edu/(S(2gyea3jdte5h1cqd10bpuf...

<http://www.slideworld.com/slideshow.aspx/Multi-Carrier-CDMA-2230052>

**Session input 9**

**SubTopic:Recap:Optical Networks**

**Suggested Activity: question and answer**

* What is the advantages of optical CDMA?
* Give the details of ultra high capacity networks

**SubTopic::Advantages of WDM and introduction to EDFA**

**Suggested Activity: Slide representation**

The advantages of wavelength division multiplexing and possibilities of signal impairments are discussed and EDFA concept is explained

**SubTopic:Performance of EDFA+ WDM networks**

**Suggested Activity: chalk and talk**

The combined effects of EDFA and WDM networks are explained

**SubTopic: conclusion**

**Suggested Activity: cross word puzzles**

The optical networks are summarized using cross wordpuzzles

<http://en.wikipedia.org/wiki/Optical_amplifier>

<http://www.ijarcsse.com/docs/papers/June2012/Volume_2_issue_6/V2I600125.pdf>

<http://www.tlc.unipr.it/bononi/ricerca/edfa.html>

**Suggested Activity: Cross word puzzles**

The optical network all are summarized by giving cross word puzzles.to the students. Most of them filled it correctly by discussing with one another each bench.

## Across

1. One of the SONET architecture
2. Logical manner in which nodes are linked together
3. SONET/SDH architecture is called as
4. Standard signal format in North America

## Down

1. Connects the adjacent pieces of equipment
2. Information transmitted in the form of light pulses only
3. Access to an optical data bus is achieved by
4. An important SONET/SDH network element
5. Loss due to coupler itself

From the cross word puzzle ,the students are answered well and the optical network section is recalled.

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From the cross word puzzle ,the students are answered well and the optical network section is recalled.