**Q1. Explain the followings:**

–Screened Twisted Pair

1. Consist of Outer Jacket , Overall Shield covering all the pair shields for twisted pairs of conducting cables which are usually covered with a plastic color coated insultations
2. This is the most advanced twisted pair of wire
3. The purpose of shield is to avoid external interference and avoidance, it protects from external factors from interference
4. It is a wrapped around each twisted pair which is a foil material
5. Then four wrapped around in a metallic braid.
6. This gives extra reliability and assurance to avoid external interference in protected and secured data transmission
7. There is also an extra drain wire which is used to ground into the metal shell of a connector
8. Reduced electromagnetic interference

–Advantages of Coaxial Cables over TP (Twisted Pair)

1. Twisted Pair supports one way of communication.
2. A Coaxial Cable consist of a copper wire, which is covered with a insulation and copper mesh which is a di-electric again covered with an outside non-conductive insulation material.
3. This helps to avoid interference of electromagnetic field carrying the signal
4. The Electromagnetic field carrying signal exists only in the space between inner and outer conductors, Hence can be installed next to metal objects without the power loss
5. It helps in longer distance transmission and have good resistance to interference
6. It can carry high frequency electric signal with low losses
7. It protects the signal from external electromagnetic interference
8. This helps in Higher data transmission rate

–Single Mode Step Index and Multimode Graded Index Optical Fibres

Single mode step index--

1. Step index means sharp step in the index of refraction between core and cladding interface
2. It indicated that step index core and cladding have their own constant index of refractions N1 & N2 respectively

Multimode Graded index

1. In graded index, index of refraction is not constant but vary smoothly across the diameter of the core
2. Index of refraction is increasing as one goes near the centre and decrease at the outer core edges, index of refraction is maximum at the centre of the core. Index of refraction is constant for cladding part of the fibre

–Amplitude Modulation Index

1. AMI is the ratio of amplitude of two signals - modulating signal to the carrier signal it is represented by “m”

Vm/ Vc = m

1. It is also called -- Modulation factor ro coefficient of modulation or degree of modulation
2. Multiplying m by 100, gives percentage modulation
3. Since modulating signal voltage mist be less than carrier voltage the m factor is should be less than 1.

**Q. What is the difference between POTS, ISDN and DSL?**

**Ans.**

**POTS – Plain old Telephone Service - 56 kbps**

* Introduced in 1990s , they used copper pair wires
* Was used for Analog voice only
* Calls were very expensive because they needed circuit between calling partied
* Dedicated operator was needed to connect calls
* There were Switching Centres or exchange place where the physical connectivity was done by the operators to connect two nodes
* Later the Operators were replaced by automated switch mechanism and help in connecting the two operators
* POTS is a circuit switched tech

**ISDN – Integrated Service Digital Network – 128 kbps**

* ISDN is a dial up connection
* Cannot offer higher data rates
* ISDN helps in sending data in FAX format
* If the connector wants to connect over a phone call as well as send a FAX or communicate over a FAX ISDN service needs to be setup.
* It uses the current copper wire infrastructure
* It uses Circuit switching but also provides access to packet switched networks
* Integrates Voice Video and data on the POTS
* It can handle more bits per seconds which includes both analog and digital signals
* Th ISDN Technology transmits Voice and data at 128 kbps up or downstream
* It Uses Q.931 signalling protocols
* Allows users to access internet through a digital modem

Two types of ISDN – Narrowband and Broadband ISDN

Advantages-   
- Better speed, high quality & reliability  
- Alternative to dial up connection with high speed

**DSL – Digital Subscriber Line – 1544 kbps**

* DSL transmits voice and digital data over same telephone line
* It uses high frequency bands for data and lower for voice.
* It has high speed data transmission rate
* It has two types – Asymmetrical DSL 0 which has different upload and download speeds   
  the Symmetrical DSL has same uplink and downlink Data rates
* The Uplink Data rate range is typically 10 times lesser than the downlink rate
* The same Uplink and downlink rates – either higher D/L or Lower U/L
* DSL is always on connection
* Offers much higher data rates

**Q. What are the some of the key points about Wireline Regulations, which Communication act would you refer to for Wireline Competition?**

**Wireline Regulations –**

* The rates of Wireline and wireless services are not tariffed or regulated in most developed countries
* FCC has radiation safety requirement for wireline service operations
* FCC requires a proper framework for broadband Access to the internet over wireline Facilities i.e. Federal register volume 67, no 40
* FCC establish balance between competition and regulation for the technologies that rapidly evolve and converge
* Preserve the essential public benefits from legacy regulation, even as TSO and their customers move away from traditional regulated wireline services

**Wireline Competition-**

In order to maintain telecom rate regulations and avoid monopoly there are two acts by FCC in 1934 which focused on regulation and not development and promotion

There are two Acts –   
Wireline Competition Under the 1996 Act And

Telecommunications act of 1996

Transmission media –

Wireline – twisted pair, coaxial cable, optical fiber

Deployment considerations -

* Speed distance, cost ease of installations, reliability,

Unshielded, Shielded, screened

Conductive barrier – in the shielded

Unshielded – outer jacket, with insulated wires, no of twists in wire varies – twisted pairs reduces the signal degradation crosstalk and interference caused by emi inference and radio magnetic frequency. Color code used to get the 568 A & 568 B color standards.

UTP

– 4 pair copper wire

* Each pair is covered by insulation
* Eac pair is twisted around each other
* No of twists in the wire pairs varies
* Conductors are covered by insulating plastic wires

Optical fiber –

* Best to operate in large communication signals transmission

Provide high transmission capability

High bandwidth, less attenuation and longer distance communication possible

* Deployment Convenience – easy to deploy, flexible, smaller in size, light weught large operating temperature range
* Travelling medium is glass hence Fast , immune to electromagnetic interference, hard to lap into, cheaper to operate, hard to tap into cyberspace

Applications – Long Haul trunk / Backhauls

Metropolitan trunk

Rural exchange trunks, subscriber loops

Fiber optic sensors and lasers, illuminating and imaging, LANs in Computer netwokrs

Types Optical fibers-

Multimode – wider core diameter, short distance communication links, used where high power must be transmitted., used where high powere must be transmitted

Single mode – one light can travel, short distance communciation linkscore diameter is small,

Step index means sharp step in the index of refraction between core and cladding interface.

This indicates in step index, core and cladding have their own constant index of refractions N1 & N2 respectively

Multimode Graded index, graded index is index of refraction is not constant but vary smoothly across the diameter of the core.

Index of refraction is increasing as one goes near the center while decreasing near outwer core edges. Index if refraction is maximum at center of the core. Index of refraction is constant for cladding of the fiber