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### Unit 2

**Physical Layer:** Analog signal, digital signal, the maximum data rate of a channel, transmission media (guided transmission media, wireless transmission, satellite communication), multiplexing (frequency division multiplexing, time-division multiplexing, wavelength division multiplexing). Guided Media (Wired) (Twisted pair, Coaxial Cable, Fiber Optics). Unguided Media (Radio Waves, Infrared, Micro-wave, Satellite).

### Unit 3

**Data Link and MAC Layer:** Data link layer services, error detection and correction techniques, error recovery protocols (stop and wait, go back n, selective repeat), multiple access protocols with collision detection, MAC addressing, Ethernet, data link layer switching, point-to-point protocol.

### Unit 4

**Network layer:** Networks and Internetworks, virtual circuits and datagrams, addressing, subnetting, Dijkstra Routing algorithm, Distance vector routing, Network Layer protocol- (ARP, IPV4, ICMP).

### Unit 5

**Transport and Application Layer:** Process to process Delivery- (client-server paradigm, connectionless versus connection-oriented service); User Datagram Protocols, TCP/IP protocol, Flow Control. FTP (File Transfer Protocol), SMTP (Simple Mail Transfer Protocol), Telnet (Remote login protocol), WWW (World Wide Web), HTTP (HyperText Transfer Protocol), URL (Uniform Resource Locator).

### Essential/recommended readings

1. Tanenbaum, A.S. & Wethrall, D.J. *Computer Networks*, 5<sup>th</sup> edition. Pearson Education, 2012
2. Forouzan, B. A. *Data Communication and Networking*, 4<sup>th</sup> edition. McGraw-Hill Education, 2017

### Additional References

1. Comer, D. E. *Computer Networks and Internet*, 6<sup>th</sup> edition. Pearson Education, 2015.
2. Stallings, W. *Data and Computer Communications*, 10<sup>th</sup> edition. Pearson education India, 2017.

### Suggested Practical List :

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
2. Simulate and implement stop and wait protocol for noisy channel.
3. Simulate and implement go back n sliding window protocol.
4. Simulate and implement selective repeat sliding window protocol.
5. Simulate and implement distance vector routing algorithm.
6. Simulate and implement the Dijkstra algorithm for shortest-path routing.