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- g. Which of the following types of signal requires the highest bandwidth for transmission?
- (A) Speech (B) Music
(C) Video (D) Satellite links
- h. Most commonly used protocol in Data Link Control procedures is _____
- (A) Sliding window protocol with go-back-N
(B) Stop-and-wait sliding window protocol
(C) Sliding window protocol in general
(D) Sliding window with selective repeat
- i. Which of the following is application layer protocol?
- (A) ARP (B) FTP
(C) RARP (D) TCP
- j. Attenuation in an optical fiber can be as small as _____
- (A) 20 dB/km (B) 0.2 dB/km
(C) 2 dB/km (D) 0.02 dB/km
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**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

- Q.2** a. What are the key benefits of layered network? (4)
- b. What do you mean by OSI? Briefly write functionalities of different OSI layers. (8)
- c. How two adjacent layers communicate in a layered network? (4)
- Q.3** a. Let us consider the telephone channel having bandwidth $B = 4$ kHz. Assuming there is no noise; determine channel capacity for the following encoding levels: (i) 2, and (ii) 128. (4)
- b. The digital signal is to be designed to permit 160 kbps for a bandwidth of 20 kHz. Determine (i) number of levels and (ii) S/N ratio. (6)
- c. What are the possible digital-to-analog modulation techniques? What do you mean by 'QAM'? (6)
- Q.4** a. In what way synchronous and asynchronous serial modes of data transfer differ? (4)

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- b. The ASCII character 'A' (41H) is sent using RS-232C interface in asynchronous mode. Draw the time domain graph assuming baud rate of 110 bits per second. (5)
- c. What is bit-stuffing? Why is it used? (7)
- Q.5** a. Explain how Selective-repeat ARQ works. (6)
- b. What is piggybacking? What is its advantage? (4)
- c. Compare synchronous TDM with statistical TDM. (6)
- Q.6** a. Explain in detail how circuit switching takes place. (6)
- b. Distinguish between virtual-circuit and datagram type packet switching. (4)
- c. What are several drawbacks associated with the use of adaptive routing compared to fixed routing? (6)
- Q.7** a. Write a brief note on three variations of CSMA protocol. (8)
- b. List out the advantages and drawbacks of bus and ring topology. (8)
- Q.8** a. Describe IP header format with the help of a diagram. Also briefly describe each field. (10)
- b. What do you mean by Address Resolution Protocol? (6)
- Q.9** Write short notes on:
- (i) Working of e-mail (6)
- (ii) Comparison of TCP and UDP. (5)
- (iii) Multicasting. (5)