

- N.B. :** (1) **All** questions are **compulsory**.  
(2) Illustrations in-depth answers and diagrams will be appreciated.  
(3) Mixing of sub-questions is not allowed.  
(4) **Figures** to the **right** indicate **full** marks.

1. Attempt the following (any **two**) :— 12
  - (a) Describe the causes of impairment in detail.
  - (b) Write a note on Star topology.
  - (c) Draw the Timing diagram for 10110 using NRZ-L, NRZ-I and RZ scheme.
  - (d) What is shift keying technique ? Discuss any two shift keying techniques.
  
2. Attempt the following (any **two**) :— 12
  - (a) Write a short note on DSSS.
  - (b) Explain Microwaves in brief.
  - (c) What is TSI ? Explain its role in a time division switching.
  - (d) Define frequency division multiplexing. What is the minimum bandwidth of a link on which 12 voice channels of 4 KHz bandwidth with guard bands of 500 Hz are multiplexed.
  
3. Attempt the following (any **two**) :— 12
  - (a) Explain the working of Stop-N-Wait ARQ. with the help of flow diagram
  - (b) What is the significance of Hamming distance ? Find the hamming distance for codeword d(00000,11110).
  - (c) Explain in brief different types of HDLC frame.
  - (d) Explain CRC detection technique.
  
4. Attempt the following (any **two**) :— 12
  - (a) How does token passing protocol prevent data collision.
  - (b) Explain Hidden and exposed station problem in wireless LANs.
  - (c) State and explain different types of Backbone networks.
  - (d) Explain filtering capability of bridges in brief.
  
5. Attempt the following (any **two**) :— 12
  - (a) What are the responsibilities of transport layer in the OSI model.
  - (b) Write a note on Piggybacking
  - (c) Explain CDMA in brief.
  - (d) Explain the structure of Twisted pair cable with the help of diagram.