Q.1  
a. What is OSI Reference Model? Draw the model with the help of a neat diagram.

b. If a periodic signal is decomposed into five sine waves with frequencies of 100, 300, 500, 700, and 900 Hz, what is its bandwidth? Draw the spectrum, assuming all components have a maximum amplitude of 10 V.

c. What are the various functions performed by the data link layer?

d. What is channelization? Define Time Division Multiple Access.

e. How the information about the other routers(nodes) are maintained by a router on the network?

f. What is Fragmentation? Explain the fields related to Fragmentation.

g. What is World Wide Web? Explain the architecture of WWW. (7 \times 4)

Q.2  
a. How the interaction between the various OSI Layers can be established? Define the services between various layers with the help of suitable diagrams. (9)

b. What is digital–to-analog conversion? What are the various types of Digital-to-Analog Conversion? Explain FSK in detail. (9)

Q.3  
a. Explain the Noisy Channel Protocol: Go-Back-N ARQ. (9)

b. Define the throughput of Pure Aloha? A pure ALOHA network transmits 200-bit frames on a shared channel of 200 kbps. What is the throughput if the system (all stations together) produces-
   (i) 1000 frames per second
   (ii) 500 frames per second
   (iii) 250 frames per second (9)
Q.4  
   a. Write a brief note an CSMA/CD. (5)
   b. Prove that utilization of a server in M|M|1 queue is ρ. (5)
   c. What is the Isolated Routing? Explain one isolated routing in detail. (8)

Q.5  
   a. What is IP Addresses? Categorize the IP addresses into various classes. (9)
   b. What is IPv4 Protocol? Show IPv4 datagram format with the help of a suitable diagram and briefly explain various fields therein. (9)

Q.6  
   a. How Addressing Mechanism takes place in Transport layer? Explain the functioning in detail. (9)
   b. Briefly explain two protocols used in Transport Layer for Internet. Explain the TCP service model and segment header. (9)

Q.7  
   a. Explain the functioning and steps used in Substitution and Transposition Ciphers. (9)
   b. What is File Transfer Protocol? What are the various transmission modes of FTP? Explain briefly. (9)