// ASSIGNMENT

// Submission Date: 22 Magh

// SET 1

1. a) Draw neat diagram of PSTN hierarchy and explain the role of local and tandem exchange. Also explain transmission impairments. [7]
b) Draw the frame format of 30 voice channel PCM and explain (T1 and E1). Compare the SONET and SDH in data rate. [8]

2) a) Compare among circuit switching, message switching and packet switching. Explain on types of operation of time switch and space switch. [7]

b) Draw and explain the drive mechanism of a rotary switch in Strowger switching system. How does a computer controlled "Stored Program Control" effectively manage the switching and signaling functions in an automatic switching system of telecommunication network? Explain in detail with figure. [8]

3) a) Define signaling system. Explain with block diagram the relationship between CCITT Signaling System No. 7 functional architecture, levels and OSI layers. [7]

b) Why is MPLS popular? Explain it with neat diagram and list out benefit of MPLS. [8]

4) a) A PBX has 3 operators on duty and receives 400 calls during the busy hour. Incoming calls enter a queue and are dealt with in order of arrival. The average time taken by an operator to handle a call is 18 seconds. Call arrivals are poissonian and operator service times have a negative exponential distribution. [7]

i) What percentage of calls have to wait for an operator to answer them?

ii) What is the average delay, for all calls and for those which encounter delay?

iii) What percentage of calls are delayed for more than 30 seconds.

b) Derive the mathematical model for loss call system (Erlang B) and for delayed system (Earlang C). Elaborate the meaning of blocking system and delayed system. [8]

5) a) Define ISDN and BISDN. Explain the protocol architecture of ISDN along with B-channel and D-channel. [7]

b) What is X.25? Describe the architecture of X.25 protocol layers. Explain Frame relay. [8]

6 a) Explain the need for layered protocol. How the network functions are divided in various layers in OSI model? [7]

b) An exchange serves 2000 subscribers. If the average BHCA is 10,000 and CCR is 60%, calculate the [8]
i) busy hour calling rate.

ii) If A group of five trunks is offered 2E of traffic. Find:

i) GOS

ii) Probability that only one trunk is free

7) Short notes on (all of them)

a) space-division multiple access (SDMA) , CDMA

b) Diversity system

c) Slotted-Aloha and pure-Aloha

d) Real time transport protocol and Resource reservation Protocol

// SET 2

1 a. What is FFTH (Fibre to the Home Network) and triple play service provided by Nepal Telecom? The trend shows that Telco operators are replacing their existing copper cable Landline network with Fibre network. Give reasons to support your answer for the same. [7]

b) "Crossbar system is more economic solutions in switching compared to stronger switches", Justify. Design a two stage network using 4*4 switches, to connect 16 incoming trunks to 16 outgoing trunks, using a consistent numbering arrangement for associating the switches with links. [8]

2. a) List out the essential features of line coding? Generate HDB3 and B8ZS waveforms for the following bit pattern: 10110000000010000011 [7]
b) Explain SDH and list out its benefits over PDH? What are the important characteristics of ALOHA, slotted ALOHA and CSMA/CD protocols. [8]

3 a) what is DTMF and pulse dialing, explain with figure? Explain the relationship between CCITT no.7 functional levels and layers of OSI seven layer model. [7]

b) what is multipath propagation? What type of Fading is more serious in Telecommunication? Explain the various reception methods of diversity techniques. [8]

4 a) A group of 20 trunk provides a grade of service of 0.001 when offered 12 E of traffic. [7]
i) How much is the GOS improved if one extra trunk is added to the group?
ii) How much does the GOS deteriorate if one trunk is out of service?

b) Define ISDN? Explain the protocol architecture of ISDN along with its features and application.[8]

5 a) what do you mean by elastic store? Discuss about routing control and flow control in network management. [7]

b) Explain Real Time Transport protocol? Explain the working of resource reservation protocol (RSPV) with example. [8]

6 a) What is convergence of media? Explain integrated and differentiated service architectures with their advantages and disadvantages. [7]

b) Comparing with the traditional TDM network, what do you think are the key features that NGN has incorporated that highly motivates telecom authorities to migrate toward NGN? Explain with its architecture, concept and suitable scenario of its implementation. [8]

7. Short notes on (all four of them) :
a) STM-1 Vs STS-1 Frame
b) Numbering and Charging Plan
c) OSI model

d) SONET