Code: D-20 Subject: ELECTRONIC SWITCHING SYSTEMS
Time: 3 Hours Max. Marks: 100

NOTE: There are 11 Questions in all.

Question 1 is compulsory and carries 16 marks. Answer to Q. 1. must be written in the space provided for it in the answer book supplied and nowhere else.
Answer any THREE Questions each from Part I and Part II. Each of these questions carries 14 marks.
Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or best alternative in the following: (2x8)

a. The amplifiers which are inserted at intervals to amplify the signal and compensate for transmission loss on the cable are called

(A) line amplifiers. **(B)** repeaters.
(C) regenerators. **(D)** compandors.

b. A telephone line busy signal is a repeating combination of _____ signals that are on for half a second and off for half a second.

(A) 10 Hz and 20 Hz. **(B)** 480 Hz and 630 Hz.
(C) 200 Hz and 400 Hz. **(D)** 480 Hz and 680 Hz.

c. The _____ electronic switch is the most popular switch being used.

(A) No. 1 ESS **(B)** step-by-step
(C) Strowger **(D)** crossbar

d. _____ indicates the average number of calls that can be made at the same time during the busy hour.

(A) Traffic Density **(B)** Grade of service
(C) Busy hour **(D)** Load factor

e. _____ are the databases that provide information on advanced call-processing capabilities in an out-of-band signalling network.

(A) Signal Switching Points (SSPs)
(B) Signal Transfer Points (STPs)
(C) Signal Control Points (SCPs)
(D) SS7s

f. _____ is the most common method currently being used to build LANs.

(A) Token ring **(B)** FDDI
(C) ATM **(D)** Ethernet

g. The earliest method used to detect data transmission errors is called _____.

(A) CRC 16 **(B)** CRC 32
(C) ARQ **(D)** Parity

h. Cross talk is most commonly reduced by _____.

(A) adding more plastic wire insulation
(B) keeping cables in dark conduit
(C) twisting wires together
(D) None of the above.

PART I
Answer any THREE Questions. Each question carries 14 marks.

Q.2 a. Describes how a uniselector can be used as a selector hunter or line finder. Also discuss the design parameters of a Strowger Switching System. **(10)**

b. Traffic engineers are monitoring a local CO switch. At the busy hour they measure 9700 calls with an average time of 145 seconds/call. Calculate the traffic density. **(4)**

Q.3 a. With the help of a neat diagram, explain the basic mechanism of Time Division Switching. Also explain how a Time Slot Interchange Switch works. **(9)**

b. How many subscribers can be supported in bi-directional PAM switching bus, if the pulse width of the PAM sample is 125 ns? **(3)**

c. A local loop is 3 mile long. Calculate the capacitive reactance for the loop at 2 KHz. Given that C = .083 μF / mile . **(2)**

Q.4 a. Explain briefly how Touch Tone Dial Telephone works. Show how the harmonic frequencies of any two adjacent base frequencies in DTMF Telephone cannot match within the first 15 harmonics. **(10)**

b. Signal voltage of a communication system is measured at 45 volts rms and signal noise on the same is measured at 0.9 volts rms. Calculate SNR in dB. **(4)**

Q.5 a. Why were Cross Bar Switches slower than Electronic Space Division Switches? Explain the Centralized SPC organization. How distributed SPC is better than Centralized SPC. **(8)**

b. During the busy hour 1200 calls were offered to a group of trunks and six calls were lost. The average call duration was 3 min. Find Traffic Load, Traffic Carried, Grade of Service, total duration of the periods of Congestion. **(6)**

Q.6 a. What is SS7 protocol stack? With the help of OSI layering, explain the role of MTP protocol. **(9)**

b. Design a three stage network for connecting 100 incoming Trunks to 100 outgoing Trunks. Also find the total number of cross points. **(5)**

PART II
Answer any THREE Questions. Each question carries 14 marks.

Q.7 a. Describe various LAN topologies. Explain in detail the working of Ethernet LAN. **(9)**

b. An Ethernet operates at 10 Mbps. It is 1 Km in length and the velocity of propagation is $2 \times 10^8 m/s$. Data packets consist of 512 bits including a 64-bit overhead. A receiving terminal takes the time of one bit to access the channel in order to send an acknowledgement signal, which consists of an empty packet. At what rate can the system convey data, if there are no collisions. **(5)**

Q.8 a. Give an account of switching hierarchy. What is routing? Describe any one routing method in detail. **(9)**

b. A Token ring operates at 10 Mbps. It is 1 Km in length and the velocity of propagation is  . Data packets consist of 512 bits, including a 64-bit overhead. Fifty terminals are spaced around the ring and the node latency is one bit. Find the effective data rate that the system can convey data. **(5)**

Q.9 a. What is jitter? What type of jitter may be experienced by a telephone system communication? How jitter can be reduced in digital encoding? **(5)**

b. List and discuss five advantages of digital transmission of voice signal over analog counterpart. A seven bit uniform PCM system has a bit rate of 56 Kbps. Also calculate the SQR when the input is a sine wave covering the full dynamic range of the system. Also calculate the dynamic range of the sine wave input if the SQR is to be at least 30 dB. **(9)**

Q.10 a. Explain the operation of TST switch. How combination of Space and Time enhances the switching action and compare it with two stage switches? **(9)**

b. What does finite Queuing capacity indicate? How maximum call handling capacity is determined? **(5)**

Q.11 Write short notes on the following :-

(i) ISDN and its architecture. **(5)**
(ii) Incoming traffic and characterization. **(4)**
(iii) Networks and concentrators. **(5) (5)**