

TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
Examination Control Division  
2076 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

*Subject: - Telecommunication (EX 703)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. What is Telecommunication according to CCITU, Geneva 1992? Classify various switching systems in telecommunication. Explain the historical background of telecommunication in Nepal since 1913 A.D. [2+2+3]
2. List out the advantages of optical fiber transmission media over twisted pair and co-axial cable. Also, explain different wireless transmission media in brief. [2+5]
3. Define multiplexing and explain the working principle of FDM system with a neat block diagram. [7]
4. What do you mean by stored program control (SPC)? Explain different modes of dual processor architecture used in an electronic switching system using centralized SPC. [2+5]
5. Describe the working principle of TSI switch in sequential read, random write mode. [8]
6. List various sequence of steps used during call steps in SS7 system. [7]
7. Define Traffic Intensity and Grade of Service (GOS). In a telephone system, the average call duration is 2 minutes. A call has already lasted 4 minutes. What is the probability that: [2+2+2+2]
  - a) The call will last at least another 4 minutes?
  - b) The call will end within the next 4 minutes?
8. Explain national and international numbering plan with different types and examples in detail. [8]
9. What are major purpose and roles of ITU? How Nepal Telecommunication Authority (NTA) is plays the roles for regulation and development of telecommunication in Nepal? Describe. [3+4]
10. Explain static and dynamic routing algorithms used in data communication. [6]
11. Write short notes on: [4×2]
  - (i) ISDN
  - (ii) Kendall-Lee notation for queuing system

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Exam.	Back		
Level	BE	Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject: - Telecommunication (EX703)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
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1. Why digital switching system is preferred over manual switching system? Briefly explain evolution of telecommunication in context of Nepal. [4+4]
2. What are the causes of cross talk? Explain the operation of two wires to four wire hybrid transformer. [3+5]
3. What are the strength and weakness of TDM and statistical TDM? How statistical TDM recover weakness of TDM? Explain STDM with its frame format. [4+2+2]
4. Describe technical structure of a telephone exchange. Compare TST and STS switch used in digital telephone exchange system. [4+4]
5. What is CCS? Explain basic call set-up in SS7 signaling system? [2+6]
6. During the busy hour, on an average, 30 E is offered to a group of trunks and on average the total period during which all trunks are busy is 12 sec and two calls are lost. [3+3+2]
  - i) Find the average number of calls carried by the group
  - ii) Find the average call duration
  - iii) Show that the average number of calls offered to the group during a period equal to the average call duration is 30
7. What are the roles of ITU? Explain numbering plan for national and international telephony systems. [4+4]
8. Explain working principle, topology and modem connection of ADSL. [8]
9. What are the characteristics of simple queuing system? Explain Kendall-Lee notation for queuing system. [2+6]
10. Write short notes on: [4+4]
  - i) Architecture of ISDN Network
  - ii) Adaptive and non adaptive algorithm

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1. What is Telecommunication according to CCITU, Geneva 1992? Experts say that Telecommunication is not a sporadic creation. It has come through an evolutionary process. Explain the historical background of telecommunication in Nepal since 1913 A.D. [8]
2. Differentiate between wireless and wired communication media with examples. Briefly explain four-wire transmission system and operation of hybrid. [3+5]
3. Why pulse stuffing is needed? Compare the light sources LED and LASER in telecommunications. [4+4]
4. What are the basic functions of a conventional exchange? Write economic and technical advantages of PCM switching compared to its analog switching. [4+4]
5. Describe common channel signaling system (SS7) protocol structure. [8]
6. Define and differentiate between GOS and Blocking probability in a loss system. Explain the national numbering planning according to E.164. [3+5]
7. What are the purpose of ITU? How is NTA helping in regulation and development of telecom in Nepal? Explain. [3+5]
8. Explain ISDN with different interfaces. Also mention its channels. [8]
9. On average, one call arrives every 5 seconds. During a period of 10 seconds, what is the probability that: [8]
  - i) No call arrives?
  - ii) One call arrives?
  - iii) Two calls arrive?
  - iv) More than two calls arrive?
10. Write short notes on: [4×2]
  - a) ADSL
  - b) Virtual-circuit network

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1. a) List the major drawbacks of manual telephone exchanges. [2]  
 b) Explain the working principle of the Strowger switching mechanism and justify that it was the beginning of the automatic switching system. [4]
2. How does a single twisted pair cable maintain a full duplex connection in the local loop? Describe the need and operating mechanism of the two-wire to four-wire converter with the help of a neatly labeled diagram. [2+4]
3. Clarify the North American (T1) and European (E1) frame structures along with their multiplexing hierarchy, and for each hierarchical level provide the bit rate calculation. [6]
4. a) Derive the necessary conditions for a 3-stage network to be strictly non-blocking. [7]  
 b) In the case of a Time Slot Interchanger (TSI), compare the working mechanisms between Sequential Write and Random Read with Random Write and Sequential Read. [5]
5. a) Describe the design considerations to be considered while creating an in-channel multi-frequency signaling system. [4]  
 b) Compare the SS7 protocol stack with the OSI layers. Describe the purpose and the format of the signal units transferred by the second message transfer part (MTP-L2) [2+6]
6. a) A device in a telephone exchange is required to commence operation within an average period of 10 milliseconds after receiving a calling signal.  
 (i) If the device is held, on average for 50 milliseconds per call, how many calls can it handle per hour?  
 (ii) If the device is required to handle 18,000 calls per hour, what is the maximum permissible average holding time? [2+4]  
 b) Provide the Kendall-Lee notation for Erlang's delay traffic model and derive its blocking probability. [7]
7. Describe the functions of the three sectors of the International Telecommunication Union (ITU). [4]
8. a) Differentiate between datagram switching and virtual circuit switching. [2]  
 b) Explain how IP switching and soft switching allow a call to be made from a personal computer with Internet access and running Skype to a telephone connected to PSTN? [5]
9. Use examples to show that the link-state routing protocol is an adaptive routing algorithm. [6]
10. Write short notes on the following: [4+4]
  - a) Dual processor architecture in SPC exchanges
  - b) ISDN structure, services, reference points and channels

TRIBHUVAN UNIVERSITY  
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**Examination Control Division**  
2075 Chaitra

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*Subject: - Telecommunication (EX 703)*

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1. What is Telecommunication? Explain the evolution of telecommunication with reference to the development of switching system. [2+6]
2. What are the differences between guided and unguided media? Explain briefly how two wire to four wire transmission is carried out in telecommunication. [2+6]
3. What are the different multiplexing techniques used in telecommunication? Explain briefly. Also discuss the North American and European standard of TDM with their hierarchies and data rates. [4+4]
4. Differentiate between TST and STS switch. Design a three stage switching system having 4 stage array of 5 input line and 6 second stage array. Also calculate the total number of cross points of the switching system. [3+6]
5. During the busy hour, on an average, 40E is offered to a group of trunks and on average the total period during which all trunks are busy is 20s and four calls are lost.
  - (i) Find the average number of calls carried by the group
  - (ii) Find the average call duration
  - (iii) Show that the average number of calls offered to the group during a period equal to the average call duration is 40. [3+3+2]
6. Differentiate between in-channel signaling and common channel signaling. Also explain the Architecture of Common channel signaling system 7 with proper block diagram and Protocol stack. [3+5]
7. Explain briefly the role of NTA in Telecommunication sector of Nepal. [5]
8. Differentiate between circuit switch and packet switch. [4]
9. Discuss about the various types of flow control mechanisms used in data communication. [6]
10. What is ISDN? Explain the ISDN Architecture with proper block diagram. Also explain different channels used in ISDN. [2+4+2]
11. Write short notes on: [4×2]
  - a) Tele-traffic models with finite and infinite sources
  - b) Development of telecommunication sector in Nepal starting from 1913 A.D

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**Examination Control Division**  
2073 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject: - Telecommunication (EX703)**

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1. Classify various switching systems in telecommunication. Mention functions of digital switching system. [4+4]
2. Explain how hybrid transformer and balancing network together act as four wire / two wire termination set. How does it eliminate the singing problem? [6+2]
3. Differentiate between T1 and E1 systems used for TDM system showing different levels of multiplexing and data rates. [8]
4. Explain three different modes of dual-processor architecture used in an electronic switching system using centralized SPC. [8]
5. Describe CCS7 protocol stack. Why common channel is preferred over inchannel signaling? [6+2]
6. During the busy hour, 1200 calls were offered to a group of trunks and 6 calls were lost. The average call duration was 3 minutes. Find. [2+2+2+1+1]
  - a) The traffic offered
  - b) The traffic carried
  - c) The traffic lost
  - d) The GoS
  - e) The total duration of % congestion
7. What is a space switch and time switch? How STS switch is differ then TST switch? Explain with telephone switching diagram. [8]
8. Explain national and international numbering plan with different types and examples in detail. [8]
9. Write the guidelines of CCITT used to measure busy hour in its recommendation E.600. What are function and duties of NTA? What are the sectors of ITU? [4+4]
10. Explain integrated service digital network. Mention types of ISDN channels. [6+2]

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What is Telecommunication? Experts say that Telecommunication is not a sporadic creation. It has come through an evolutionary process. Explain the historical background of telecommunication in Nepal since 1913 A.D. [8]

2. Explain with suitable diagram guided and unguided transmission media used in telecommunication. [8]
3. Explain multiplexing. Compare FDM, TDM and WDM with neat diagram. [2+6]
4. Design space switch with following input trunks, output trunks and connection memory. How many virtual paths are required in this switch? Write down each output channels of output trucks in time  $t_0$  to  $t_3$ , with respect to decode logic. [5+1+2]

Channels	Input Trunk																			
	I <sub>1</sub>				I <sub>2</sub>				I <sub>3</sub>				I <sub>4</sub>				I <sub>5</sub>			
	A <sub>4</sub>	A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	B <sub>4</sub>	B <sub>3</sub>	B <sub>2</sub>	B <sub>1</sub>	C <sub>4</sub>	C <sub>3</sub>	C <sub>2</sub>	C <sub>1</sub>	D <sub>4</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>1</sub>	E <sub>4</sub>	E <sub>3</sub>	E <sub>2</sub>	E <sub>1</sub>

Time	Connection Memory																								
	O <sub>1</sub>					O <sub>2</sub>					O <sub>3</sub>					O <sub>4</sub>									
$t_0$	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$t_1$	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
$t_2$	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
$t_3$	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0

Decode Logic

5. What is signaling system? What is the reason behind the development of SS7? [2+6]
6. Define blockage, lost calls and grade of service in telephone traffic engineering. During a busy hour 800 calls were offered to a group of trunks and 50 calls were lost. If the average call duration was 3 minutes, find the traffic offered, carried traffic, lost traffic, GoS and duration of congestion. [2+6]
7. Standard are very important and critical in the systematic development of telecommunication sector. What are the strategic objectives in ITU-T activities to realize overall mission of the telecommunication standardization sector. [8]
8. Nepal Telecom offers a service that allows you to make a phone call from a PC to an ordinary phone. This means that voice call must pass through both the internet and through a telephone network. Discuss how this might be done. [8]
9. Explain adapting and non-adapting routing algorithms used in data communication. [8]
10. Write short notes on: [4+4]
  - a) TST and STS
  - b) Telephone numbering in PSTN



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1. Explain digital switching system. Mention functions of switching system in telecommunication. [8]
2. List the types of transmission media. Briefly explain four-wire transmission system and operation of hybrid. [2+6]
3. What is multiplexing? Why pulse stuffing is needed? Explain TDM of analog and digital sources and then show complete TDM PCM system with data rates. [2+2+4]
4. What is multistage switching? Describe the STS switching with neat diagram and its blocking probabilities. [2+6]
5. What are the basic switching functions? Calculate and draw, how many cross points are found in three stage switching system, where as 3 stage, array of 4 input lines and 4 second stages array. [3+5]
6. Why signaling is important in telecommunication system? Briefly explain SS7 protocol stack. [2+6]
7. What are the formulas used in telecommunication traffic engineering decision tree? Describe the blocking formulas uses in finites sources. [4+4]
8. What is pure loss system? Describe the teletraffic Binomial model. [2+6]
9. List the regulation of Nepal Telecommunications Authority. What are the basic charging plan needs for Telecommunication Company? [4+4]
10. Write short notes on: [2×4]
  - a) ADSL
  - b) ISDN

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Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
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Year / Part	IV / I	Time	3 hrs.

**Subject: - Telecommunication (EX703)**

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1. Draw the switching hierarchy used in telecommunication switching system. Describe the working principle of Marconi's induction coil radio transmitter. [4+4]
2. What are the sources of attenuation and distortion? Explain with neat diagram. [8]
3. What is wave length division multiplexing? Explain its light sources characteristics and differentiate between it. [4+4]
4. What is the advantage of multi-stage switching system over single switching system? Explain TST switching with neat diagram and its blocking probability. [2+6]
5. What are advantages and issues of PCM switching when it compared with analog switching? Calculate and draw, How many cross points are found in three stages switching system, where as 3 stages array of 4 input lines and 5 second stages array. [3+5]
6. What is signaling connection control part? Explain its message structure. [2+6]
7. What are the formula uses in telecommunication traffic engineering decision tree? Describe the blocking formulas uses in infinites sources. [4+4]
8. What is queuing system in telecommunication? Explain characteristics of simple queuing systems with Kendall's rotation. [2+6]
9. What roles NTA plays in the development of telecommunication in Nepal. Describe E.164 for Nepal. [4+4]
10. What is soft switching? Describe its architecture functions and management. [2+6]

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INSTITUTE OF ENGINEERING  
**Examination Control Division**  
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

*Subject: - Telecommunication (EX703)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
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1. With a neat sketch of technical structure of a telephone office, explain the distribution plant. [10]
2. What is the difference between two and four wire communication? Describe the four wire communication. [4+6]
3. Compare and contrast among various multiplexing techniques used in telecommunication. [10]
4. What are principles of digital exchange? Describe non blocking switches with 3 stages switching matrix. [4+6]
5. What is signaling in communication system? Explain its forms and types in case of telecom network. [10]
6. A group of 25 servers carry traffic of 5E. If the average duration of a call is 4 minutes, determine the number of calls put through by a single server and group as a whole in 1 hour. [10]
7. Explain the purpose, duties and responsibilities of International Telecommunication Union (ITU).
8. What are the ISDN service connections? Explain. [10]

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7/17 Day

23 TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
Examination Control Division  
2072 Kartik

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

*Subject: - Telecommunication (EX703)*

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1. Describe the roles and operations of an exchange. Write down the demerits of manual switching in telecommunication. [7+3]
2. In case of transmission media of radio signal what are guided and unguided media? Compare them also. [10]
3. What is digital carrier system? Discuss the advantages and disadvantages of various multiplexing techniques? [6+4]
4. Compare between TST and STS switch used in digital telephone exchange system. State the advantages and disadvantages of DTMF telephone set. [6+4]
5. What are message transfer parts? Write addressing of the signaling units. [6+4]
6. What is pure loss system? Explain Engset model. [4+6]
7. How Marconi's induction coil radio transmitters function as wireless technology? Differentiate between Mobile vs. Nomadic. Highlight the important features of Nepal Telecommunication Act 2053. [4+2+4]
8. Write short notes on: (any two) [5+5]
  - a) IP switching
  - b) ISDN
  - c) DSL and ADSL

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Exam.	New Back (2066 & Later Batch)		
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1. Describe briefly the major milestone in the evolution of telecommunication. [7]
2. Explain the subscriber loop or line plant in case of structure of a telephone office or exchange. [7]
3. Why multiplexing is needed in telecommunication? Describe wavelength division multiplexing in brief. [2+5]
4. What is the principle of time division switching? Describe the operation of time division space switch. [2+5]
5. What do you mean by combination switch? Explain the working principle of 3 -stage combination switch with its block diagram. [2+6]
6. A group of 30 servers carry traffic of 15E. If the average duration of a call is 3 minute, determine the number of calls put through by a single server and group as a whole in 1 hour. [5]
7. What is the purpose of ITU (International Telecommunications Union)? Explain. [6]
8. Describe the interfaces available in ISDN. [5]
9. What is the significance of routing and flow control in data communication? Describe briefly about the dynamic routing. [2+2+3]
10. Explain the operation of ADSL showing modem connection and its topology. [6]
11. What do you understand by signaling? How channel associated signaling differs from channel signaling? Explain in brief. [2+5]
12. Write short note in numbering plan for land line telephone exchange. [8]

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01/05

25 TRIBHUVAN UNIVERSITY  
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**Examination Control Division**  
 2070 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject: - Telecommunication (EX703)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
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1. Explain the role of Logic or digital electronics in upgrading the electromechanical switching system into digital switching system. [7]
2. Describe briefly the advantages of fiber optic cable over the copper cable. Advise suitable application of both the media. [4+3]
3. Explain FDM hierarchy. Describe T carrier system showing the frame structure of T1 level and different multiplexing levels with data rates. [3+5]
4. What are the drawbacks of ST and TS switch and how are they solved by STS switch? Explain. [2+2+4]
5. What is the advantage of common channel signaling system #7 (SS7)? Explain its working principle. [2+5]
6. A public call office (pco) is installed in a busy part of a town. 300 persons use the booth everyday. The average holding time for a call is 5 minutes. There is a suggestion from the public that another pco is required in the same locality as the waiting times are unduly long. Analysis the situation using M/M/1 queue and determine if the suggestion deserver serious consideration. [5]
7. Describe the role of Nepal Telecommunication Authority (NTA) for the development of telecommunication sector in Nepal. [4]
8. Define traffic intensity in telecommunication. Describe the measurement of traffic intensity in terms of CCS, CM and CS. [3+5]
9. What are the advantage and disadvantage of DTMF telephone set? Explain. [8]
10. Write short notes on: (any two) [9+9]
  - i) IP Telephone System
  - ii) DSL and ADSL
  - iii) ISDN

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Exam.	Nepal Board (2070) (100 Marks)		
Level	BE	Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

*Subject: - Telecommunication (EX703)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
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1. What is telephone exchange? Describe the major types of telephone exchanges in brief. [3+4]
2. Define subscribe loop. Explain the subscribe loop system showing cable hierarchy for subscriber loops. [1+5]
3. Explain the European TDM system used in telecommunication system. [7]
4. Explain the working principle of a Digital Telephone Exchange. [10]
5. What Time (T) switch used in digital telephone exchange. [5]
6. Explain the major building blocks or parts used in SS7 network. Show the different links used in SS7 network also. [5+3]
7. Explain the major tasks and goals of traffic engineering in telecommunication along with different types of busy hour defined by CCITT in its recommendation E.600. [3+3]
8. A group of 30 servers carry traffic of 15E. If the average duration of a call is 3 minutes, determine the number of calls put through by a single server and group as a whole in 1 hour. [5]
9. Describe the charging plan used in a telephone network. [4]
10. Write short notes on:
  - a) Nepal Tele Communications Authority (NTA) [4]
  - b) IP Telephony or IP switching or VoIP (voice over internet protocol) [12]
  - c) DSL (Digital Subscriber Line) [6]

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Exam.	Programme		
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1. Explain the evolution of Telecommunication. [8]
2. Explain the followings in case of telecommunications:
  - a) Transmission of radio signal in twisted pair and coaxial cable [2]
  - b) The role of characteristic impedance in the flow of radio signal from one equipment to another equipment [2]
  - c) The role of Hybrid transformer or circuit [2]
3. Explain the working principle of TDM. Describe T1 carrier system showing the frame structure and different multiplexing levels. [2+5]
4. Describe the different configurations of a dual processor architecture used in a digital or SPC exchange. [6]
5. What do you mean by S (space) and T (time) switches? Show that 3-stage STS or TST network can minimize the switching problems associated with 2-stage ST or TS network with their working models. [2+6]
6. What is common channel signaling? Explain the working principle of signaling system 7 (SS7). [2+6]
7. In case of telecommunications explain:
  - a) The role of traffic engineering [9]
  - b) Two methods of calculating traffic intensity [6]
8. Write the guidelines for transmission plan defined by CCITT in its recommendation Q.40. [4]
9. What is flow control in data communication network? Explain. [4]
10. Describe the basic services in ISDN with its architecture. [4+4]
11. Explain the operation of ADSL showing modem connection and its topology. [6]

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INSTITUTE OF ENGINEERING  
Examination Control Division  
2068 Bhadra

Exam. Level	Regular / Back		
	BE	Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

*Subject: - Telecommunications*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
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1. Explain the working principle of time switch and space switch used in digital telephone exchange. What are their drawbacks and how are they solved? Explain. [5+5+4]
2. What are the advantages of DTMF telephone set over conventional pulse dialing telephone set? Explain the design features considered in DTM telephone set. [4+12]
3. Draw a neat diagram of an internet structure and explain the role of repeater, bridge, router and gateway. [4+10]
4. What is communication protocol? Explain the OSI architecture used in data communication. [2+14]
5. Write notes on: (any two) [10+10]
  - a) IBM Ring LAN
  - b) Traffic Engineering
  - c) ISDN

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Exam.	Back		
Level	BE	Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

*Subject: - Telecommunications*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Explain the signalling technique used in 30 VF Channels European TDM system used in telecommunication. With a block diagram explain the construction and working principle of a digital telephone exchange. [6+10]
2. Explain the two methods of telephone traffic calculations. Explain the working principle of time (T) switch. What is its drawback of using in switching network of a digital telephone exchange and how is it solved? Explain. [6+5+2+5]
3. What is protocol and why is it required in data communication? Explain. [2+10]
4. What is ETHERNET? How does it work? What is its drawback and how is it solved? Explain. [2+5+4+3]
5. Write short notes on: (any two) [10+10]
  - a) Switching techniques in data communication
  - b) Queuing model in delay system
  - c) Line coding principle in digital communication

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Exam. Level	BE	Regular / Back	Full Marks	80
Programme	BEX		Pass Marks	32
Semester / Part	IV / II		Time	3hrs.

*Subject: - Telecommunications*

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1. With a logical diagram explain the working principle of space (s) switch. State its drawback in using in switching network of a digital telephone exchange and explain how is it solved. Explain the working principle of a Regenerator used in digital communication. [5+2+5+6]
2. State the advantages and disadvantages of a DTMF telephone set used in digital telephone exchange. Also explain its design features. [4+10]
3. Explain the basic components of data commutation system. With proper diagrams, explain the dynamic routing algorithm used in data communication. [6+8]
4. Explain the IP addressing in TCP/IP protocol regarding data communication. [14]
5. Write short notes on any two of the following: [10+10]
  - a) Classification of switching system in telecommunication
  - b) Queuing model in delay system
  - c) Internetworking

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Exam. Level	BE	Back	
		Full Marks	80
Programme	BEX	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

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1. What is "talk off" in case of DTMF (Dual Tone Multi Frequencies) telephone set connected in digital exchange? What are the design features considered in making DTMF telephone set to protect from "talk off" problem. Explain. [2+2+12]
2. With the help of a neat diagram, explain the working principle of an Electronic Exchange. [4+12]
3. Why line coding is required in PCM (Pulse Code Modulation) system? Is it possible to implement NRZ (Not Return to Zero), RZ (Return to Zero) and AMI (Alternate Mark Inversion) coding techniques? If not, explain why it is not possible and which coding technique solves this problem? [2+1+8+5]
4. What are the switching techniques in data communication system? Explain. [2+14]
5. Write short notes on any two of the followings: [8+8]
  - a) OSI (Open System Interconnection) Architecture in Data Communication System
  - b) Cambridge Ring LAN
  - c) Hierarchies in Digital Transmission System

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Exam.	Regular/Back		
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*Subject: - Telecommunications*

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- ✓ Attempt All questions.
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1. What is the difference between DTMF (Dual Tone Multi-Frequency) telephone set and pulse dialing telephone set? Explain the design features of DTMF telephone set. [2+14]
2. With an example, clarify the concept of frame and time slot in case of TDM (Time Division Multiplexing) system. With respect to first order PCM system, explain the mechanism involved in American 24 voice channel multiplex system. [6+10]
3. What is Time (T) Switch? How does it work? Is it possible to make a switching network in a digital exchange with the help of two stage Time-Space (TS) switch? If not, explain why and how this problem is solved. [1+4+1+10]
4. What is protocol and why is it needed in data communication? Explain. [2+10]
5. Write short notes on any two of the following: [10+10]
  - a) Network Topologies and IBM Ring LAN in the data communication
  - b) ETHERNET
  - c) Line coding principles in PCM system

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Exam.	Regular/Back		
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**Subject: - Telecommunications**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Explain the working principle of two stage Time-Space (TS) switch. What are its drawbacks and how they are removed? Explain. [5+2+3]
2. What do you mean by end-to-end signalling in DTMF telephone system? Explain the design features of DTMF telephone set. [4+12]
3. Explain the working principle of packet switching technique used in data communication system. [12]
4. Describe the working principle of IBM ring LAN. [12]
5. Write short notes on any two of the following. [10+10]
  - a) ISDN
  - b) Subscriber loop signalling in telecommunication system
  - c) Packet routing algorithms in data communication system
6. Define busy hour, traffic intensity and grade of service in telephone traffic system. A group of 40 servers carry a traffic of 20 erlangs. If the average duration of call is three minutes, calculate the number of calls put through by a single server and the group as a whole in an one-hour period. [1+2+2+5]

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