TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2080 Baishakh

Exam.	Back		
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. Define the role and need of exchange or branch office used in telecommunication. Explain the operation of a rotary dial with associated drawbacks. [4+4]

2. a) A uniform transmission line can be regarded as a cascade of infinite symmetrical sections of impedances, each of infinitesimal size. Draw an incremental length of a transmission line clearly showing the distributed inductance, capacitance, resistance and conductance per unit length. [2

   b) A 10 m W audio signal is to be transmitted over 100 km of line having an attenuation of 2 dB/km to produce a signal at the receiving end also of 10 mW. The noise level on the line is–138 dB m. The signal is amplified at various points along the line. The available amplifier has a 50 dB gain and a noise factor of 7 dB. Determine the output SNR in dB. [3]

   c) A four-wire circuit has a round-trip delay of 20 milliseconds. The propagation time for the two-wire circuit connected to each end is 1 millisecond, and its attenuation is 6 dB. The balance return loss is 3dB and the stability margin is 3 dB. Calculate the attenuation of the talker echo, delay of talker echo, and attenuation of listener echo. [3]

3. Define multiplexing. Discuss about FDM and TDM with the help of neat block diagrams. [2+6]

4. a) Derive expressions for the blocking probability of both STS and TST switches. Show that the blocking probability of a TST switch is lower than that of a STS switch. [6]

   b) A TST network is used in a digital switch and the secondary multiplex contains 120 time slots. How many time slots would be included in the time multiplexed space stage for non-blocking operation? What would be the blocking probability if the time multiplexed space stage contained 120 time slots, 150 time slots, and 200 time slots? Assume channel occupancies of 0.6E and 0.9E. [6]

5. What is SS7 (Signallign System #7)? Explain the steps involved in call set up and release in a system using SS7. [2+6]

6. What do you mean by traffic intensity and Grade of service (GOS)? Explain the national numbering planning with standard format. [4+4]

7. During the busy hour, 1000 calls were offered to a group of trunks and 5 calls werelost. The average call duration was 4 minutes. Find: [8]
   a) The traffic offered
   b) The traffic carried
   c) The traffic lost
   d) The grade of service
   e) The total duration of the period of congestion

8. What role NTA plays in the development of telecommunication in Nepal? Describe E. 164 for Nepal. [3+3]

9. What is soft switching? Describe its architecture and mangement. [2+4]

10. Describe the working mechanism of link-state routing and distance vector routing with the help of Dijsktra's algorthm and Bellman-Ford algorithm. [6]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2079 Bhadra

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.*
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- ✓ *Assume suitable data if necessary.*

1. a) Draw the pulse dialing waveform for the number 401. [1]
   b) Calculate the time required to dial the number 011-91-44-414630 using a rotary dial telephone. Assume the subscriber takes 600 milliseconds on average to rotate the dial for a single digit; the pulse rate is 10 pulses per second with a 10% tolerance, the inter-digit gap is 200 milliseconds, and the duty ratio of a pulse is 33%. [3]
   c) In the strowger switching system, briefly describe the two design approaches used to provide subscriber access. [4]
2. What do you mean by impairments to voice channel transmission? Explain the following impairments: Attenuation Distortion, Phase Distortion and Noise. [2+6]
3. What is wavelength division multiplexing? Describe T carrier system showing the frame structure of T1 level and different multiplexing levels with data rates. [3+5]
4. Explain the various modes of operation of dual processor configuration used in a centralized digital exchange. [6]
5. What is the advantage of multi-stage switching system over switching system? Explain TST Switching with neat diagram and its blocking probability. [3+4]
6. a) Provide the block diagram of channel associated signaling. Describe how common channel signaling achieves faster call set-up and greater trunking efficiency as compared to channel associated signaling. [4]
   b) What is the purpose of the message transfer part (MTP) in SS7 signaling? Provide the specific functions and the frame format for MTP level-1, MTP level-2 and MTP level-3 in SS7. [4]
7. Describe the blocking formulas uses in infinites source. Over a 20-minute observation interval, 40 subscribers initiate calls. Total duration of the calls is 4800 seconds. Calculate the load offered to the network by the subscribers and the average subscriber traffic. [4+4]
8. What is queuing system in telecommunication? Explain characteristics of sample queuing systems with Kendall's notation. [3+5]
9. a) Provide the specific functions of ITU-R, ITU-D and ITU-T for the global advancement in the field of information and communication technologies. [5]
   b) Distinguish between the roles of ITU member states, regulators and service providers to eliminate ICT accessibility barriers in their countries. [3]
10. Differentiate between asynchronous and synchronous DSL. Explain the modems used in ADSL. [2+4]
11. Briefly explain IP telephone system. [5]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2078 Bhadra

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. Explain the concept of exchange. Describe telecommunication switching hierarchy in brief. [3+4]
2. Compare and contrast between guided and unguided media with examples. Describe the need and operating mechanism of the two-wire to four-wire hybrid converter with the help of neatly labeled diagram. [3+4]
3. Define multiplexing. Compare FDM, TDM and WDM with neat diagram. [1+6]
4. Design a three-stage, 200×200 switch with division of input lines (N =200) into groups with each group of n = 20 lines. Use k number of crossbars in the middle stage where k = 4. Also, redesign this three stage 200×200 switch using Clos criteria with a minimum number of cross points. [8]
5. Why signaling system is required? Mention the signaling activities in telephone system. Draw a common channel signaling system (SS7) protocol architecture with appropriate labels. [1+2+4]
6. What is multi stage switching? Explain TST switching with neat diagram and its blocking probability. [2+5]
7. How do you define to differentiate between Grade of Service (GOS) and Blocking Probability (P_B)? During a busy hour 600 calls were offered to a group of trunks and 40 calls were lost. If the average call duration was 2.5 minutes, find the offered traffic, carried traffic, lost traffic, Grade of Service and total duration of congestion. [2+6]
8. In any telephone network organization, effective network management is required to maintain efficient operations in case of equipment failures and traffic overloads. Suppose you are working in a reputed telecommunication company as a telecom engineer and you are given a responsibility to study and prepare the network planning for the extension of telephone services in remote area. List out the major network services and network plans that you should consider for fulfilling your responsibility. Explain with logical arguments. [7]
9. Explain the roles of NTA regarding telecommunication in Nepal. What are the major roles of ITU? [4+2]
10. Describe different interfaces and channels available in ISDN. [4+4]
11. What is soft switching? Describe its architecture functions and management. [2+6]

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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 devleopment 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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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Ashwin

Exam.	Back		
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. 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
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Chaitra

Exam.	Regular / Back		
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? 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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23 TRIBHUVAN UNIVERSITY
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Examination Control Division
2075 Ashwin

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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23 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2074 Ashwin

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.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. 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]

	Input Trunk																			
	I_1				I_2				I_3				I_4				I_5			
Channels	A_4	A_3	A_2	A_1	B_4	B_3	B_2	B_1	C_4	C_3	C_2	C_1	D_4	D_3	D_2	D_1	E_4	E_3	E_2	E_1

Connection Memory

Time	Output Trunk																			
	O_1					O_2					O_3					O_4				
t_0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0
t_1	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1
t_2	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0
t_3	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	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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2074 Chaitra

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Subject: - Telecommunication *(EX703)*

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- ✓ *Attempt **All** questions.*
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- ✓ *Assume suitable data if necessary.*

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) Vertual-circuit network

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25 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2073 Shrawan

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)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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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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23 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
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)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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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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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)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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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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23 TRIBHUVAN UNIVERSITY
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Examination Control Division
2072 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.
- ✓ *Attempt **All** questions.*
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- ✓ *Assume suitable data if necessary.*

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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25 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Shawan

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)*

- ✓ 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. 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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23 TRIBHUVAN UNIVERSITY
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.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

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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25 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2070 Ashad

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)*

- ✓ 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 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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25 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
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.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

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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25 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2069 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.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

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 Hybird 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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