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. 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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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	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
t_3	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	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

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. 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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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 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.		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 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]

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10. Write short notes on: [2×4]

   a) ADSL
   b) ISDN

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

Subject: - Telecommunication (EG772EX)

✓ 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 a telecommunication? Keeping in view with the evolution of telecommunications, explain the concept of switching system.   [2+10]

2. With a block and logical diagram, explain the working principle of space switch (s) used in digital switching system. Justify, why TST switch and why not TS or ST switch are used in digital switching system?   [6+6]

3. With a block diagram explain the working principle of a Digital Telephone Exchange.   [12]

4. What is a communication protocol and why is it required in data communication? Explain.   [12]

5. What is an Ethernet? Keeping in view of CSMA and CSMA/CD explain its working principle.   [2+10]

6. Write short notes on: (any two)   [10+10]

   a) Switching techniques in data communication
   b) Telephone Traffic Engineering
   c) Routing Algorithm in data communication

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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]

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Exam.	Regular / 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 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.	Regular/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 importance of traffic engineering and its unit in telecommunication. [12]

2. Why line coding is required before the PCM signals to be connected to the digital line? Justify that Unipolar Non Return to Zero (NRZ), Return to Zero (RZ) and bipolar Alternate Mark Inversion (AMI) codes can not be used in line coding. [4+12]

3. What is space switch? How does it work? Describe the working principle and drawbacks of two stage Space-Time switch. And also explain to solve the drawbacks problem. [2+6+6+6]

4. What is communication protocol and why is it required in data communication? Explain. [1+11]

5. Write short notes on any two of the following: [10+10]

   a) Digital Telephone Exchange
   b) Routing Algorithm in Data Communication
   c) Queuing Theory in Delay System

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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. 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	
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. 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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