

QUATERNARY SECTOR

DOMAIN: INFORMATION AND COMMUNICATION TECHNOLOGY

FIELD: NETWORK AND TELECOMMUNICATION

SPECIALTY: TELECOMMUNICATION

PAPER : CASE STUDY

PAPER	CASE STUDY		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
Written practical	05 hours	TEL19	12

OBJECTIVES OF THE PAPER: Evaluate Students capability to analyze a problem situation and advise on possible solution using the global knowledge acquired in all the courses in Telecommunication

FORMAT OF THE EXAM PAPER: The case study paper is organized in 2 sections as shown below:

Exam Paper	Speciality/ Option	Different sections of the paper	Duration per section:	Mark allocated	Percentage	Concerned courses
CASE STUDY	TEL	Section A: Transmission:	3h	20	50	-Analogue transmission techniques -Digital transmission techniques -Optical fibre transmission
		Section B: Telephony : ;	2h	20	50	-Mobile networks -Telephony and switching
TOTAL			4h	40	100	

SECTION A: Transmission (weight = 50%, 20mks/40, 3h)

This section comprises one (01) exercise in which the candidate is evaluated on transmission. The exercise should involve at least three of the following topics:

- Analogue modulation
- Digital Modulation
- Optical fibre transmission
- HERTZIAN beam and satellite transmission

SECTION B: Telephony (weight = 50%, 20mks/40, 2h)

This section comprises one **(01) exercise** in which the candidate is evaluated on Mobile networks; Telephony and switching. The exercise should involve at least two of the following topics:

- Mobile Telephony (principle of mobile telecommunication, architecture of GSM)
- Telephony and switching (General Principles of Telephony, architecture of public and private telephony networks, traffic analysis in PABX)

NOTICE: The paper should contain the following elements:

- A marking guide with marks allocation to both sections and sub section questions
- The total number of pages of the paper

PAPER: ELECTRONIC CIRCUITS

PAPER	Electronic circuits		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
<i>Written</i>	<i>04 hours</i>	<i>TEL16</i>	<i>05</i>

OBJECTIVES: The aim of the electronic paper is to evaluate the abilities of the candidate to understand and analyze electronic circuits used in telecommunications.

FORMAT OF THE EXAM: This paper comprises 4 sections whose contents are taken from the following courses:

EXAM PAPER	Speciality/ OPTION	DIFFERENT SECTIONS OF THE PAPER	DURATION PER SECTION	MARK ALLO- CATED	PERCENTAGE	CONCERNED COURSES
Electronic circuits	Telecommunication	SECTION A: Circuits analysis	45min	10	25	Circuit theory 1 Circuit theory 2
		SECTION B: Analogue circuits	1H15min	10	25	Analogue electronics1 Analogue electronics 2
		SECTION C: Digital circuits	1H00min	10	25	Digital electronics1 Digital electronics 2
		SECTION D: Telecom system electronics	1H00min	10	25	Electronic functions Telecom systems electronics
		Total	04H	40	100	

SECTION A: Circuits analysis (weight = 25%, 10mks/40, 45min)

This section comprises one (01) exercise or problem in which the candidate should carry out the analysis of one of the following circuits:

- Network theorems applied to dc circuits containing either independent sources, dependent sources or both
- Sinusoidal steady state analysis

SECTION B: Analogue circuits (weight = 25%, 10mks/40, 1H15min)

This section comprises one (01) exercise or problem based on any of the following topics:

- Diode circuit (zener regulated power supplies, diode clipping or clamping circuits)
- Transistor small signal amplifiers (either BJT or FET)
- Linear Op-amp circuits

SECTION C: Digital circuits (weight = 25%, 10mks/40, 1H00min)

This section comprises one (01) exercise or problem in which the candidate will either design or analyze of one of the following logic circuit:

- Adder or subtractor
- Comparators
- Encoder or decoder
- Multiplexer or demultiplexer

- Registers
- Counters or decounters

SECTION D: Telecom system electronics (*weight = 25%, 10mks/40, 1H00min*)

This section comprises one **(01) exercise or problem** in which the candidate will either design or analyze one of the following logic circuit:

- Filters (either 1st order or 2nd order, passive or active)
- Oscillators (either sinusoidal or non-sinusoidal)
- AM or FM Modulation or demodulation circuits
- Power amplifiers

NOTICE: The paper should contain the following elements:

- A marking guide with marks allocation to both sections and sub section questions
- The total number of pages of the paper

PAPER : SIGNAL PROCESSING

PAPER	Signal processing		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
Written	03 hours	TEL17	05

OBJECTIVES: The aim of the signal processing paper is to evaluate the abilities of the candidate to explain the characteristics of signals and the basic techniques used to process analogue and digital signals.

FORMAT OF THE EXAM: This paper comprises 3 sections whose contents are taken from the following courses:

EXAM PAPER	Speciality/ OPTION	DIFFERENT SECTIONS OF THE PAPER	DURATI ON PER SECTION	MARK ALLOC ATED	PERCE NTAGE	CONCERNED COURSES
SIGNAL PROCESSING	TEL	SECTION A: Fundamentals of signals	45min	10	25	Signals and systems
		SECTION B:Analogue signal processing	1h	14	35	Signal processing 1
		SECTION C:Digital signal processing	1h15mins	16	40	Signal processing 2
Total			02H	40	100	

SECTION A: Fundamentals of signals (weight = 25%, 10mks/40, 45min)

This section comprises one (01) exercise in which the candidate is evaluated on the fundamentals of analogue and digital signals. The exercise should involve at least three of the following topics:

- Graphical representation of signals
- Classification, properties and units of signals and systems
- Fourier series
- Amplitude and phase spectrum of signals
- Laplace transforms
- Sampling theorem

SECTION B: Analogue signal processing (weight = 35%, 14mks/40, 1h)

This section comprises one (01) exercise in which the candidate is evaluated on the processing techniques applicable to analogue signals. The exercise should involve at least two of the following topics:

- Fourier transforms
- Amplitude and phase spectrum of signals

- Analogue filters design or analysis

SECTION C: Digital signal processing (weight = 40%, 16mks/40, 1h15min)

This section comprises one **(01) exercise** in which the candidate is evaluated on the processing techniques applicable to digital signals. The exercise should involve at least two of the following topics:

- Z-transforms
- Discrete Fourier transform
- Digital filters design or analysis
- Encoding
- Applications on compressing (audio, video)

NOTICE: The paper should contain the following elements:

- A marking guide with marks allocation to both sections and sub section questions
- The total number of pages of the paper

PAPER : TELECOMMUNICATION SYSTEMS

PAPER	TELECOMMUNICATION SYSTEMS		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
written	04 hours	TEL19	4

OBJECTIVES OF THE PAPER: To be able to Evaluate Students ability to integrate different sub systems in order to constitute a telecommunication

FORMAT OF THE EXAM PAPER: There should be four (4) questions. Each question corresponding to a section

Exam Paper	Option	Different sections of the paper	Duration per section:	Mark allocated	Percentage	Concerned courses
Telecommunication Systems	TEL	SECTION A :Telecommunication I	1h	10	25	-Signals and systems -Analogue transmission techniques
		SECTION B:Telecommunication II	1h	10	25	-Digital transmission techniques -Telephony and switching
		SECTION C :Telecommunication III	1h	10	25	-Telephony on IP -Mobile Network
		SECTION D: Computer Network	1h	10	25	-Networking Fundamental
TOTAL			4h	40	100	

SECTION A: Telecommunication I

The questions of this section are to be taken from the courses;

- Signals and systems
- Analogue transmission techniques

And cover the following parts;

- General structure of a transmission system
- Characteristics of a system
- Transmission media
- Graphical representation of signals

SECTION B : Telecommunication II

The questions of this section are to be taken from the courses;

- Digital transmission techniques
- Telephony and switching

SECTION C: Telecommunication III

The questions of this section are to be taken from the courses;

- Telephony on IP
- Mobile Network

SECTION D: Computer Network

The questions of this section are to be taken from the course, Networking Fundamental

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PAPER: ANTENNA AND SPACE TELECOMMUNICATION

PAPER	ANTENNA AND SPACE TELECOMMUNICATION		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
<i>written</i>	<i>04 hours</i>	<i>TEL21</i>	<i>04</i>

OBJECTIVES OF THE PAPER: to be able to Evaluate Students ability to understand the difference between satellite link line of sight and terrestrial links lines of sight and the specific types of antennae used on satellite links.

FORMAT OF THE EXAM PAPER:The antenna and space Telecommunication is organized in 2 sections as shown below:

Exam Paper	speciality/Option	Different sections of the paper	Duration per section:	Mark allocated	Percentage	Concerned courses
Antenna and Spacetelecom	TEL	Section A: Antennae	2h	20	50	-Antenna and space Telecommunication
		Section B: Link analysis and equipment on satellite :	2h	20	50	-Satellite and high frequency transmission
TOTAL			4h	40	100	

PAPER : PRACTICE OF TELECOMMUNICATIONS

PAPER	PRACTICE OF TELECOMMUNICATIONS		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
Practical	04 hours	TEL22	6

Objectives of the paper: To be able to Evaluate the level of the candidate in the comprehension and implementation of telecommunication systems

FORMAT OF THE EXAM:

- The system studied should be one practical topic of telecom system to be handed to the candidate in the telecommunication laboratory.
- The functional description and the work required in any section should also be clearly presented by the manufacturer
- The telecom lablab should be equipped of the equipments needed for the installation of the system studied.
- The candidate should be able to analyze the proposed system then develop within the time allocated the procedure to be followed to properly conduct the manipulation according to the functional logbook given by the examiner.

The paper is organized in 03 sections but the 3rd section is optional as shown below:

EXAM PAPER	SPECIALITY/ OPTION	DIFFERENT SECTIONS OF THE PAPER	DURATION PER SECTION	MARK ALLOCATED	PERCENT AGE	CONCERNED COURSES
Practice of Telecommuni- cation	TEL	SECTION A: Preparation	1H00	10	25	- Minor project - Satellite and high frequency transmission
		SECTION B:Manipulation in Laboratory	02H00	20	50	- Temecom systems electronics - Electronic functions
		SECTION C:Technical report	1H00	10	25	
		Total			04H	40

SECTION A: Preparation

The questions of this section are suppose to evaluate any of the following abilities:

- Installation, troubleshooting and maintenance of telecommunication systems projects (sound broadcasting systems, Wi-fi networks, VSAT, WIMAX, cable TV systems, TNT....)

- Realisation of Electronic functions used in telecommunication systems

and cover the following parts:

- Block diagram of the system
- Analyse the functioning of the system and do necessary calculations
- Presentation of expected results from the experiment

Section B: Manipulation (Installation and measurement)

The questions of this section are to be taken from the course Installation and maintenance of telecommunication systems projects and cover the following parts:

- Identify the components used in the installation
- Identify the apparatus used for the measurement
- Mounting of the system
- Testing and measurements of quantities like modulating signals, modulated signals, directivity of antenna, gain of the antenna, WIFI signals etc of the system
- Analyse the results

Section C: Technical Report (optional depending on the topic chosen)

The report is written and consists to use telecommunication knowledge to:

- Interpret the results
- Compare with theoretical results
- Drawing of curves, charts and interpret if necessary
- Conclusion

Notice: when the topic is so that the candidate should not write the report, the marks of the report are to be added to those of the manipulation

EVALUATION CRITERIA

- Marking of the preparation according to the mark allocation fixed by the examiner (25% mks)
- Wiring and troubleshooting (20% mks)
- Tests (1st trial = (30% mks), 2nd trial = (20% mks), 3rd trial = (10% mks))
- Technical report (25% mks)

PAPER : ELECTRONIC LABORATORY

PAPER	Electronic Laboratory		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
<i>Practical</i>	<i>04 hours</i>	<i>TEL23</i>	<i>04</i>

OBJECTIVES OF THE PAPER: The aim of this paper is to evaluate the ability of the candidate build a telecommunication system's electronic circuit then carry out appropriate tests and measurements

FORMAT OF THE EXAM: The electronic lab paper is based on one telecom system electronic function. It is organized in 3 sections as shown below:

EXAM PAPER	SPECIALITY/ OPTION	DIFFERENT SECTIONS OF THE PAPER	DURATION PER SECTION	MARK ALLOCATED	PERCENTAGE	CONCERNED COURSES
Electronic Laboratory	TEL	SECTION A: Preparation	1H00	10	25	- Analogue electronics - Digital electronics - Electronic functions - Telecom systems electronics
		SECTION B: Manipulation in Laboratory	02H00	20	50	
		SECTION C: Technical report writing	1H00	10	25	
Total			02H	40	100	

SECTION A: Preparation (weight = 25%, 10mks/40, 1h00)

This is the written part of the lab and it should comprises the following elements:

- The circuit diagram of the studied function
- A set of questions to be answered by the candidate and through which the theoretical results expected from the circuit will be determined.

SECTION B: Wiring, Tests and measurements in lab (weight = 50%, 20mks/40, 2H00)

This section consists of a set of questions indicating the different tests or measurements to be carried out by the candidate in lab after built the circuit on a breadboard. Hence the candidate is supposed to:

- Identify the electronic components to be used and carry out basic tests
- Identify and set up the measurement apparatus to be used
- Build the circuit on breadboard
- Supply and carry out the measurements required by the examiner.

SECTION C: Technical report writing (weight = 25%, 10mks/40, 1H00)

In this section, the candidate should write the technical report which consists at least of the following parts:

- Aim of the lab
- Presentation of the experimental results (graphs and measurements)
- Interpretations of results and comparison to theoretical results
- Conclusion

EVALUATION CRITERIA FOR THE SECTION B AND SECTION C

- Respect of the measurement procedures 50%
- Pertinence of the experimental results 50%

NOTICE: The paper should contain the following elements:

- A list of material and apparatus needed for the manipulation
- Technical documents (appendix) of the components if necessary
- A marking guide with marks allocation for both section and sub section question
- The total number of pages of the paper