# UGANDA INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

## WEEKDAY PROGRAMME END OF SEMESTER TWO EXAMINATIONS

## ACADEMIC YEAR 2023/2024

**DEPARTMENT:** ICT

**SEMESTER:** ONE

**PROGRAMME(S):** DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINERING (DEEE)

**YEAR OF STUDY:** ONE

**COURSE:** PRINCIPLES OF TELEPHONY

**COURSE CODE :** TE215

**DATE:**

**TIME:**

**DURATION:** 3 HOURS

**INSTRUCTIONS:**

(i) This paper contains two Sections: A (40 marks) & B (60 marks).

(ii) Attempt ALL questions in Section A, and ONLY THREE questions in Section B.

(iii) All questions in Section B carry equal marks.

(iv) Credit will be given for use of relevant examples and illustrations.

(v) Begin each number in Section B on a new page of the answer sheet.

(vi) DO NOT write on this question paper.

**SECTION A (40 MARKS)**

Attempt **ALL** the Questions in this Section.

1. State three basic components of a telephone network **3 marks**
2. State two main functions of a telephone set **2marks**
3. Why is the voltage supplied to a telephone kept negative **1mark**
4. What is the function of a central battery at the exchange? **1mark**
5. How is full duplex communication achieved on a two-wire telephone communication system? **1 mark**
6. State the basic loop design requirements **3 marks**
7. State two factors that limit user loop length **2marks**
8. An amplifier has an input resistance of 700ohms and a resistive load of 85 ohms when it has a r.m.s input voltage of 150mV, the r.m.s output current is 15mA. Find the gain in dB **3 marks**
9. What is the level of the signal at the output of the amplifier if the input signal value is 1mW and if the gain of the amplifier is 3dB? **3 marks**
10. State the functions of a numbering plan **3 marks**
11. What is the use of a guard band **1 mark**
12. State two functions of a protective circuit in the telephone set **2 marks**
13. State 3 advantages of message switching **3 marks**
14. Define the following
    a) Half Duplex (with examples) **2 marks**
    b) Full duplex (with examples) **2 marks**
    c) Aperiodic signal **1 mark**
    d) Encryption **1 mark**
    e) Channel capacity **1 mark**
    f) Base band transmission **1 mark**
    g) Broad Band transmission **1 mark**
15. State 3 characteristics of a periodic signal **3 marks**

**SECTION B [60 MARKS]**

Attempt **ONLY THREE** questions in this Section.

**Question 1**

a) Discuss the four parameters considered in choosing a transmission media **8 marks**

b) In a tabular format compare the following transmission media, twisted pair cable, Coaxial cable and Optical fiber cable highlighting the advantages, disadvantages and applications **12 marks**

**Question 2**

a) Define the following **8 marks. (2 Marks each)**

i. Sampling
ii. Quantizing
iii. Encoding
iv. Echo Cancellation

b) State and explain the two major forms of signaling that are used by a switching system **6 marks**

c) With the help of a diagram explain and illustrate of DSP is used in an MP3 audio player **6 marks**

**Question 3**

a) Outline 3 parts of a telephone set and explain their functions **6 marks**

b) Explain the sequence of events of a telephone call **8 marks**

c) An exchange use a -100v battery to drive users' lines. A Resistance of 450 Ohms is placed in series with battery to protect it from short circuit. The uses are required to use a telephone set which offers a dc resistance of 210 ohms. The microphone requires 80mA for proper functioning. Determine the furthest distance from the exchange at which a user can be located if 26AWG conductor is used if 84.22 Ohms/Km is its dc resistance per Km **6 marks**

**Question 4:**

a) Explain the following **1 mark each (5 Marks)**

i. Calling rate
ii. Holding Time
iii. Traffic Carried
iv. Traffic Offered
v. Traffic Path

b) A traffic of 20E is offered to a group of trunks. It was observed that 5 calls were lost during busy hour and all trunks remained busy for 20s Find;

i. the GOS **1 mark**
ii. traffic carried **2marks**
iii. average holding time. **2 marks**

c) A user makes 5 calls of durations of 10, 2,5,5,8 minutes during 4 hours of a day. Calculate;

i. the traffic intensity offered to the exchange by the user in Erlang **3 marks**

ii. the traffic intensity offered to the exchange by the user CCS **2 mark**

iii. BHCA **1 mark**

iv. and Erlang capacities **2 marks**

v. GOS of the exchange if all its 4000 users have same traffic per hour and CCR of 90% **2marks**

**Question 5**

**a)** With reference to UICT explain the operation of a PABX highlighting how it can ease administration work. **10 marks**

**b)** What is interference and explain the types of interference **5 marks**

c) What is Distortion and Explain the types of Distortion **5 marks**

**END**