ELIZADE UNIVERSITY, ILARA-MOKIN, ONDO STATE

FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST SEMESTER EXAMINATION 2020/2021 ACADEMIC SESSION

COURSE TITLE: TELECOMMUNICATION ENGINEERING

COURSE CODE: EEE 539

EXAMINATION DATE: 31ST MARCH, 2021

COURSE LECTURER: ENGR. DR. ADEDEJI

HOD'S SIGNATURE

TIME ALLOWED: 2 HOURS

INSTRUCTIONS:

1. ANSWER ANY 4 QUESTIONS
2. SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAM.
3. YOU ARE **NOT** ALLOWED TO BORROW ANY WRITING MATERIAL DURING THE EXAMINATION.

Question 1 (15 marks)

(a) With the aid of a sketch, discuss the basic elements of a telephone network.

(b) Calculate the thermal noise power and noise voltage at the input of a telephone receiver RF amplifier using a device that has a 100Ω equivalent noise resistance and a 200Ω input resistance. The telephone receiver RF amplifier operates at a frequency range of 3 to 4 MHz Assume effective noise temperature to be 25^0C.

Question 2 (15 marks)

(a) Define the following terms

(i) call rate

(ii|) call holding time

(iii)busy hour.

(b) What is signalling? Briefly discuss supervisory signalling in telephone system.

(c) On average, one call arrives every 5 seconds. During a period of 15 seconds, what is the probability that;

(i) No call arrives;

(ii) One call arrives

(iii)More than one call arrives.

Question 3 (15 marks)

(a) Define the following terms in relation to telephone system

(i) Off-hook.

(ii) On-hook.

(b)In a lost call system, a full availability group of 5 trunks is offered an average of 3E during the busy hour. Calculate the following

(i) The grade of service and comment on your answer.

(ii) The probability that all the trunks are free.

(iii) The probability that at least, one trunk is free.

Question 4 (15 marks)

(i) What are the basic requirements of a telephone switching system?

(ii) With the aid of a diagram, discuss the Crossbar switching concept.

(iii) During the busy hour, a company makes 180 outgoing calls of average duration 4 minutes. It receives 300 incoming calls of average duration 10 minutes. Find the total traffic offered.

uestion 5 (15 marks)

(a) List six (6) basic function of a telephone exchange.
(b) Sketch a lost call system showing the traffic offered, the traffic lost and the traffic carried.
(c) During the busy hour, 1200 calls were offered to a group of trunks and 6 calls were lost due to congestion. The average call duration was 3 minutes. Calculate;
  (i) The traffic offered.
  (ii) Traffic lost.
  (iii)The traffic carried.
  (iv)The grade of service.
  (v) The total duration of the period of congestion.

Question 6 (15 marks)

(a) Briefly explain PBX and PABX.
(b) List 2 impairments of a telephone channel.
(c) Calculate the grade of service, the traffic lost and the traffic carried by 5 trunks arranged in a full availability group when offered a traffic of 0.9 E.