



**ELIZADE UNIVERSITY, ILARA-MOKIN, ONDO STATE
FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING**

**FIRST SEMESTER EXAMINATION, 2020/2021 ACADEMIC SESSION
COURSE TITLE: CRYPTOGRAPHY PRINCIPLES AND APPLICATIONS
COURSE CODE: ECE417
EXAMINATION DATE:
COURSE LECTURER: ENGR. J.O. OGUNNIYI
TIME ALLOWED: 2 HOURS
INSTRUCTIONS:**

HOD's SIGNATURE

1. ANSWER QUESTION **ONE (1)** AND ANY OTHER THREE.
2. SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAM.
3. YOU ARE **NOT** ALLOWED TO BORROW ANY WRITING MATERIALS DURING THE EXAMINATION.

Question 1

John and Raymond are secondary school friends. After their secondary school education, John left for South Africa for a degree program. On Christmas day, John thought of sending a special message to Raymond secretly using an RSA algorithm. The message is “**JESUS loves YOU**”.

They both agreed on two prime numbers $X=79$ and $Y=47$ to compute the total number N . Raymond sent an Encryption number E to John to encrypt the message, while he intends to decrypt the message with Decryption number D as 97.

- What is the value of Encryption number E , which John will use for his encryption?
Show your workings clearly. **2 Marks**
- Write down what the words “JESUS Loves You” will become if Samuel decides to use the ASCII Code for encoding. **1 Marks**
- What will be the Cipher text of the word “JESUS” in the message, if the message is group into **2 words** each? **12 Marks**

Question 2

- Explain what you understand by cryptography **2 Marks**
- Explain the term steganography as a cryptography technique and illustrate the concept with an example. **4 Marks**
- Explain what you understand by entropy as it relates to information **2 Marks**
- Consider the table below. Based on the entropy of the message, design the encoding scheme for the transmission of the message.

Letter	$P_r(X=x)$
A	0.25
B	0.25
C	0.5
D	0.125

4 Marks

Question 3

- a. Explain what you understand by each of the following numbers and state each of the numbers categories between 1-10 inclusive.
- i. 4 (Modulo) 5
 - ii. Composite
 - iii. square
 - iv. Fibonacci.
- 8 Marks**
- b. Explain 4 issues addressed by cryptography principles. **4 Marks**

Question 4

- a. Explain the significant of ONE Time Pad (OTP) in guaranty perfect secrecy **4 Mark**
- b. Given the plain text below. If columnar transposition is used to encrypt the message, what will the ciphertext be?

J E S U S D
I E D F O R
M E O N T H
E C R O S S
O F C A L V
A R Y H A L
L E L U Y A
!

4 Marks

- c. Explain two reasons for video protection **4 Marks**

Question 5

- a. Justify the inclusion of complexity theory in cryptography. **2 Marks**
- b. Write a short note on each of the following as it relates to computational complexity.
- i. P class problem
 - ii. NP class problem
 - iii. NP-Hard class problem
- 6 Marks**
- ii. Explain the 4 types of cybercrime known to you **6 Marks**

Question 6

- a. Explain what you understand by Digital Right Management (DRM) as used in video protection. **2 Marks**
- b. List and Explain four (4) levels of DRM as used for video protection. **6 Marks**
- c. Explain the differencnes between copyright and patent. **4Marks**