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**ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**  
**ORGANISATION OF ISLAMIC COOPERATION (OIC)**  
**Department of Computer Science and Engineering (CSE)**

SEMESTER FINAL EXAMINATION  
 DURATION: 3 HOURS

SUMMER SEMESTER, 2022-2023  
 FULL MARKS: 150

**Hum 4441: Engineering Ethics**

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer all 6 (six) questions. Figures in the right margin indicate full marks of questions with corresponding COs and POs in parentheses.

1. a) Explain the term Data Anonymization. Discuss the data anonymization process using a suitable figure. 3 + 7  
(CO3)  
(PO1)
- b) Consider the dataset shown in Table 1. 15  
(CO3)  
(PO1)

**Table 1:** Dataset for Question 1.b

Student/Gender	Age	Score%	Class Performance	Major	
1	Female	20	84	Satisfactory	Computer
2	Male	20	89	Satisfactory	Electronics
3	Male	20	90	Satisfactory	Electronics
4	Female	21	98	Satisfactory	Electronics
5	Female	21	90	Satisfactory	Engineering
6	Male	20	90	Satisfactory	Electronics
7	Male	20	84.5	Satisfactory	Business Management
8	Male	21	84	Satisfactory	Business Management
9	Female	20	82.5	Satisfactory	Law
10	Female	21	51	Unsatisfactory	Engineering
11	Male	20	57	Unsatisfactory	Electronics
12	Female	20	53	Unsatisfactory	Engineering
13	Male	21	57.5	Unsatisfactory	Electronics
14	Male	21	43	Unsatisfactory	Engineering
15	Male	20	54	Unsatisfactory	Computer
16	Male	20	46.5	Unsatisfactory	Computer
17	Male	20	56	Unsatisfactory	Business Management
18	Male	21	46	Unsatisfactory	Business Management

The dataset has six columns: student serial number, gender, age, percentage of score in a test, class performance, and major of the student.

Apply five (5) different data anonymization techniques on these columns except class performance. Explain the outcome after applying anonymization techniques.

2. a) Explain the principle of the K-anonymity Model. 7  
(CO3)  
(PO1)
- b) Apply the 3-anonymity model over the dataset in Table 1 and show the outcome, i.e., the Released Table (RT). Your answer should be accompanied with appropriate explanation. 12  
(CO3)  
(PO1)
- c) Explain one of the reidentification attacks on the K-anonymity model. 6  
(CO3)  
(PO1)

3. a) List the major dimensions of an Information System. Explain two risks associated with an Information System. 3 + 4 (CO4) (PO1)
- b) Identify the characteristics of Symmetric/Private Key Encryption. Discuss the limitations of this encryption process. 5 + 3 (CO3) (PO1)
- c) Discuss the key characteristics of Asymmetric/Public Key encryption with an appropriate figure. How does it overcome the limitation of Symmetric/Private Key encryption? 7 + 3 (CO3) (PO6)
4. Suppose Alice wants her friends to encrypt e-mail messages using a public-key encryption system before sending the e-mails to her. Assume that computers represent text as long numbers (01 for A, 02 for B and so on), so an e-mail message is just a very big number. Alice chooses  $p = 17$  and  $q = 11$ .
- a) Find the public key of Alice. The value of public exponent or  $e$  must be between 10 and 15. 5 (CO3) (PO1)
- b) Compute the private key of Alice based on the chosen public key. Show the detailed computation. 15 (CO3) (PO1)
- c) If the plaintext ( $P$ ) which is to be sent to Alice is 32, determine the ciphertext ( $C$ ). 5 (CO3) (PO6)
5. a) List the major requirements of European Union General Data Protection Regulation (EU GDPR). 5 (CO4) (PO1)
- b) Mention different kinds of Intellectual Property Rights. Suppose someone reveals your trade secret by reverse engineering and market analysis and uses that knowledge for their goods. Can you take appropriate legal measures against that person or organization? Justify your answer and mention any assumptions if necessary. 6 + 4 (CO4) (PO1)
- c) Creative Commons License is one of the most popular public licenses. There are four baseline rights in CC licenses. Explain these baseline rights. Suppose you have built an application and want to manage its copyright so that the other users can use the system, even they can modify it but cannot use it for any commercial purpose. Which type of CC license would you use? 6 + 4 (CO4) (PO1)
6. a) Explain the term Cyber Security and its importance in the context of the current digital world. 7 (CO4) (PO1)
- b) Discuss the three fundamental pillars of the Cyber Security. 10 (CO4) (PO1)
- c) Briefly describe the following web-based attacks: 8 (CO4) (PO1)
- i Injection
  - ii DNS Spoofing
  - iii Denial of Service
  - iv URL Interpretation