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

MID SEMESTER EXAMINATION
DURATION: 1 HOUR 30 MINUTES

SUMMER SEMESTER, 2022-2023
FULL MARKS: 75

Hum 4441: Engineering Ethics

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

Answer all 3 (three) questions. Figures in the right margin indicate full marks of questions with corresponding COs and POs in parentheses.

1. a) Let's consider a scenario where a small town known as *Neverland* is faced with a decision regarding the construction of a new bridge. 10
(CO1)
(PO2)
 The town's existing bridge is old and in a state of disrepair, posing a safety risk to the residents who rely on it for daily commutes, emergency services, and transportation of goods. However, building a new bridge also requires careful consideration of the property rights of the residents of the town. Furthermore, the environmental impacts need to be also considered. Analyze the above mentioned scenario from two perspectives - Utilitarianism and Kantian Theory. Write down your actions as the mayor of the town from both perspectives.
- b) Based on your answer in Question 1.a, criticize the outcome of applying each ethical theories mentioned above. 5
(CO1)
(PO2)
- c) Identify the major differences between Act (classical form of Utilitarianism) and Rule Utilitarianism principle. 5
(CO1)
(PO1)
- d) Is it more important for a leader to possess inherent moral virtues, such as honesty and integrity, or to achieve favorable outcomes immediately through strategic decision-making and effective management? 5
(CO1)
(PO1)
2. a) Consider the following scenario: 7
(CO1)
(PO2)
 Sarah is a manager at a company that produces electronic devices. She is responsible for ensuring that the manufacturing process meets safety regulations and environmental standards. However, Sarah chooses to ignore reports from her team about unsafe working conditions in the factory and environmental violations caused by improper waste disposal practices. Despite being aware of these issues, Sarah fails to take any corrective action because addressing them would require significant time and resources, which she believes could hurt the company's profits and her own career advancement.
 Do you think Sarah's action in the above mentioned scenario demonstrate blameworthiness? Justify your answer.
- b) Consider the following scenario: 6
(CO1)
(PO1)
 A pharmaceutical company has developed a new drug to treat a rare medical condition. The drug shows promising results in initial clinical trials, but there is limited data on its long-term safety and potential side effects. Some researchers have raised concerns about potential unknown risks associated with the drug, including the possibility of severe adverse reactions in certain patient populations.
 Compare and contrast between Precautionary Principle and Burden of Proof perspective in the light of the above mentioned scenario.
- c) How can you systematically solve the moral dilemma raising in Question 2.b? Explain your answer under the framework of Ethical Cycle. 6
(CO1)
(PO1)

- d) According to the Software Engineering Code of Ethics and Professional Practice as recommended by the ACM/IEEE-CS Joint Task Force, list the eight principles that the software engineers shall adhere to. 6
(CO1)
(PO1)
3. a) Explain the situations when taking risks are ethical. 4 + 3
(CO2)
(PO2)
Suppose you have not taken any measure to address the concerns about potential unknown risks associated with the drug as described in Question 2.b. You have taken a risk by doing so. Criticize your decision of taking risk according to the situations when risks become ethical.
- b) Assume that you have checked a high-voltage power supply lines in 100 points. In your opinion, there were $50 + X$ faulty points, among which $40 - X$ points were actually faulty. The actual total number of faulty points is 45. 9
(CO2)
(PO1)
Calculate the accuracy of your testing and the percentage of Type I and Type II errors using a confusion matrix. Which type of error would be more deadly in this case?
Note that $X = \text{Last digit of your student ID} + 1$.
- c) The probability distribution presented in Table 1 shows the probability of the nature (degree) of faults found at a particular point in a high-voltage power distribution lines. 6
(CO2)
(PO1)

Table 1: Probability distribution of faults for Question 3.c

| Degree of Fault | Probability |
|-----------------|-------------|
| 3 (Critical) | 0.15 |
| 2 (Serious) | 0.30 |
| 1 (Regular) | 0.55 |

The probability distribution presented in Table 2 shows the probability of different amounts of monetary damages when there is an accident due to a fault in a high-voltage power supply lines.

Table 2: Probability distribution of monetary damages due to a fault for Question 3.c

| Amount of Damage due to a fault | Probability |
|---------------------------------|-------------|
| BDT 500000 | 0.20 |
| BDT 400000 | 0.40 |
| BDT 300000 | 0.40 |

Calculate the expected amount of damage based on the above-mentioned probability distributions.

- d) Comment on the severity of the risk (e.g., high, medium, low) as described in Question 3.c using a 3×3 risk matrix. 3
(CO2)
(PO1)