PENINSULA COLLEGE GEORGETOWN DK266-03(P)

FINAL EXAMINATION

Semester	:	**SEPTEMBER 2025 SEMESTER**
Programme Name	:	**DIPLOMA IN COMPUTER SCIENCE**
Course Code & Name	:	**DCS1123 DISCRETE MATHEMATICS**
Duration	:	**3 HOURS**

INSTRUCTIONS TO CANDIDATES:

1. Please read the instructions given in the question paper **CAREFULLY.**
2. The question paper consists of **FOUR (4)** questions.
3. Answer **ALL** questions in the question paper.
4. Answers to the questions are to be written into the examination booklet.
5. Electronic dictionaries, lecture notes, files or any unauthorised materials except writing equipment are strictly prohibited.

This question paper must be submitted along with all used and/or unused rough papers and/ or graph papers (if any). Candidates are **NOT ALLOWED** to take any examination paper(s) used or unused out of the examination hall.

WARNING:

The Examination Board of Peninsula College Georgetown regards cheating as a very serious offence and will not hesitate to mete out the appropriate punitive actions according to the severity of the offence committed, and in accordance with the clauses stipulated in the Students' Handbook, up to and including expulsion from Peninsula College Georgetown.

(*This booklet contains 4 printed pages including this page*)

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE ALLOWED TO DO SO

Answer **ALL** questions on the separate sheet provided. **[100 marks]**

1. a) Draw a logic circuit using AND, OR and NOT gates corresponding to the Boolean Expression, $Y = (\overline{AC} + D)\bar{B} + \bar{C}$ (6 marks)

   b) Let $P = \{a, b, c\}$ and $Q = \{0,1\}$.

      i) Find the Cartesian Product, $Q \times P$. (3 marks)

      ii) List the Power Sets for P. (3 marks)

   c) A hawker stall's sale per day is increasing RM1.5 per day. Assuming the hawker started with a loss of RM20 on his first day which is on 1st of September.

      i) Calculate the sales amount on the 20^{th} day. (4 marks)

      ii) Find the total sales after 1month. (4 marks)

      iii) On which n^{th}day, that the hawker breakeven his losses. (5 marks)

   Total: [25 marks]

2. a) A bag contains 30 marbles, including 10 red and 11 blue. A marble is drawn at random. Find the following probabilities.

      i) The drawn marble is red. (2 marks)

      ii) The drawn marble is not blue. (2 marks)

      iii) The drawn marble is **NOT** blue or red. (3 marks)

   b) Suppose a box filled with 2 black cards and 3 white cards, and draw 2 cards from the box without replacement.

      i) Draw the **tree diagram** to illustrate all the possible events (outcomes) for the two draws. (6 marks)

      ii) What is the probability that the both card drawn are black? (2 marks)

   c) There are 24 people ordered Cappucinno while 30 people ordered bread. It is known that there are total of 38 orders made.

      i) What is the probability to randomly choose an order which has both cappucinno and bread? (4 marks)

      ii) Draw a Venn Diagram to illustrate the probability of the orders having both items. (3 marks)

2. c) iii) What is the probability of a person ordered bread also has cappucinno in his order? (3 marks)

Total: [25 marks]

3. a) A computer monitor is using RGB values to represent their display color. Assuming there are 2^8 bits for each red, green and blue values. How many possible color can be displayed? (5 marks)

b) Assume Malaysia car plate numbers are formed by 3 alphabets in the front and at most 4 digits at the back. Calculate the possible ways to form a car plate number if:

i) Letters "I,O,Z" cannot be used in the car plate and number cannot be 0. (5 marks)

ii) The car plate is registered in Penang. (5 marks)

c) A football team manager needs to select 11 players from all his players. Given that he needs to ensure his selection consists of 4 defenders, 4 midfielders, 2 forwards and 1 goalkeeper. Currently his team has a total of 4 goalkeepers, 8 defenders, 9 midfielders and 4 forwards.

i) How many possible teams he can pick? (5 marks)

ii) If he need to pick another 5 players from any position to be his substitute team. How many possible teams he can pick? (5 marks)

Total: [25 marks]

4. a) Given the graph in Figure 4a below,

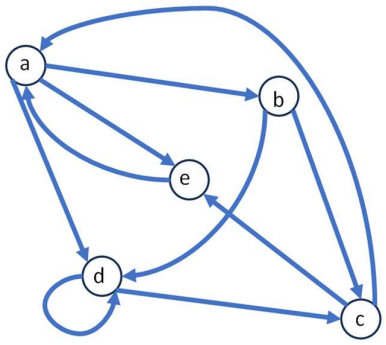

Figure *4a*

i) identify the $\deg^-$ and $\deg^+$ of each vertex. (5 marks)

ii) proof that $|\boldsymbol{E}| = \sum \boldsymbol{deg}^-(\boldsymbol{v}) = \sum \boldsymbol{deg}^+(\boldsymbol{v})$. (3 marks)

4. b) Given that the graph in Figure 4b below,

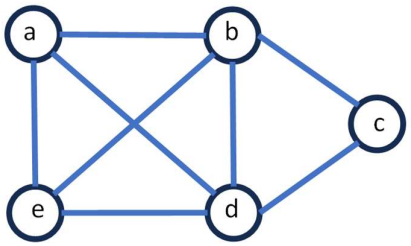

Figure 4b

i) What is the condition for a graph to has a Euler Circuit or Path? (4 marks)

ii) Does the graph in **Figure 4b** has a Euler Circuit or Path? (3 marks)

iii) What is Dirac's theorem and Ore's theorem said about Hamilton Path and Circuit? (6 marks)

iv) Does the graph in **Figure 4b** has a Hamilton Path or Circuit? (4 marks)

Total: [25 marks]

- END OF QUESTIONS -