PENINSULA COLLEGE GEORGETOWN DK266-03(P)

FINAL EXAMINATION

Semester	:	**JANUARY 2026 SEMESTER**
Programme Name	:	**DIPLOMA IN COMPUTER SCIENCE** **MICRO-AWARD IN DIPLOMA IN COMPUTER SCIENCE**
Course Code & Name	:	**DCS1123 DISCRETE MATHEMATICS** **DCS1123 MICROCREDENTIAL IN 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 the 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 19 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 or red. (3 marks)

      iii) Suppose 2 marble are drawn continuously without replacement. Draw the tree diagram to illustrate all the possible events. (6 marks)

      iv) What is the probability of getting 2 Red? (1 mark)

      iv) What is the probability of getting Blue and Red regardless of the sequence? (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)

      iii) What is the probability of a person ordered bread also has cappucinno in his order? (4 marks)

      Total: [25 marks]

3. a) A computer monitor is using RGB values to represent their display color. Assuming there are 2^4 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. (5 marks)

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

c) A university vice-chancellor needs to select 11 members to form a special academic committee. To ensure fair representation, the committee must consist of 4 Professors, 4 Associate Professors, 2 Assistant Professors, and 1 Dean. Currently, the available faculty pool consists of 4 Deans, 8 Professors, 9 Associate Professors, and 4 Assistant Professors.

i) How many possible committees can the vice-chancellor form? (5 marks)

ii) After forming the main committee, the vice-chancellor needs to pick another 5 members from the remaining faculty (regardless of their academic rank) to form a secondary advisory sub-committee. How many possible advisory sub-committees can be picked? (3 marks)

iii) How many total ways of forming the committee with advisory sub-committee? (2 marks)

Total: [25 marks]

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

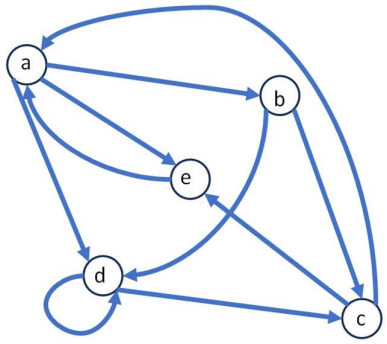


Figure 4a

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)

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

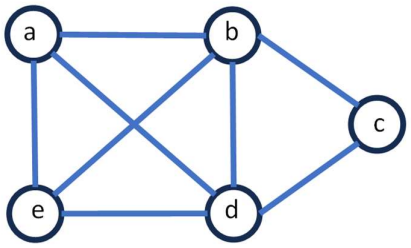


Figure 4b

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 -