UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: BGE 1122
COURSE	: FUNDAMENTAL MATHEMATICS FOR COMPUTER SCIENCE
SEMESTER/SESSION	: 2-2024/2025
DURATION	: 3 HOURS

Instructions:

1. This booklet contains **7** questions. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

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

THIS BOOKLET CONTAINS 6 PRINTED PAGES INCLUDING COVER PAGE

INSTRUCTION: ANSWER ALL QUESTIONS (100 MARKS)

QUESTION 1

a) Solve the following expression.

i. $30\times2-10\div5\times4+2$ (2 marks)

ii. $-20+5\times2-10\div5+10$ (2 marks)

iii. $2^3\times5-5+30\div10-2$ (2 marks)

iv. $35\times(55-30)\div2+10$ (2 marks)

b) Simplify the following expression.

i. $(6a^3)\times(2a^{-5})$ (2 marks)

ii. $3\sqrt{6}\times2\sqrt{3}$ (2 marks)

iii. $\dfrac{(2m^5n^3)(6mn^4)}{6m^2n}$ (3 marks)

iv. $\dfrac{x^2y^3(2xy^2)^2}{8y}$ (3 marks)

QUESTION 2

a) Solve the following inequalities.

i. $\dfrac{5x+7}{2}\le x+4$ (2 marks)

ii. $3x-1<4x+2\le1-x$ (4 marks)

iii. $|4x-1|\ge8$ (4 marks)

iv. $3(9^{x+4})=27^{x+1}$ (4 marks)

b) Given that $\log_b 3=1.5850$, $\log_b 7=2.8074$ and $\log_b 12=3.585$, find the value of

i. $\log_b 21$ (4 marks)

ii. $\log_b \sqrt[3]{4}$ (4 marks)

QUESTION 3

a) There were 4 girls and 7 boys at the birthday party. What is the ratio of girls to boys? (1 mark)

b) The ratio of red pens to blue pens is 2 : 1. There are 300 pens all together. How many red pens are there? (2 marks)

c) If 4kg of watermelon cost RM 28.30, how much would 2kg cost? (3 marks)

d) The price of a pair of shoes is RM 120 after a 20% percent discount. What is the price of the shoes before discount? (3 marks)

e) The price of a particular model of headphones was RM 25 in 2016. In 2020 the price of the same model headphones was RM 20. What is the approximate percent decrease in the price of the headphones? (2 marks)

QUESTION 4

Given that the 4^{th} term of an arithmetic progression is 18 and the sum of the first 8 terms is 124. Find

a) the first term and common difference. (5 marks)

b) the sum of all the terms from the 9^{th} term to the 16^{th} term. (5 marks)

QUESTION 5

Halim started working for a company on 1 January 2008 with an initial annual salary of RM 28800. Every January, the company increased his salary by 5% of the previous year's salary. The annual salary forms a geometric sequence with common ratio 1.05. Find

a) his annual salary, to the nearest RM on 1 January 2013. (2 marks)

b) the minimum value of n such that his annual salary in the nth year will exceed RM 40000. (6 marks)

c) the total salary, to the nearest RM, paid to him by the company, for the years 2008 to 2013. (2 marks)

QUESTION 6

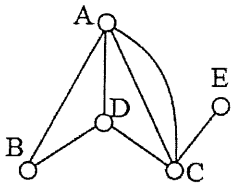

Figure 1

a) Based on graph as shown in Figure 1, list:

i. the vertex set. (1 mark)

ii. the number of edges and vertices. (2 marks)

iii. the degree of each vertex. (2 marks)

iv. the total degree of the graph. (1 mark)

b) Draw $K_{2,5}$. (2 marks)

c) Determine whether or not the graph in Figure 2 is bipartite. Give the bipartition sets or explain why the graph is not bipartite. (2 marks)

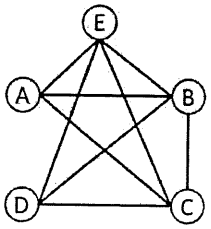

Figure 2

d) Suppose a graph has vertices of degree 1, 2, 3, 4, 4 and 6. How many edges does the graph have? If possible, draw the graph. (4 marks)

e) Determine whether the given graph in Figure 3 has an Euler circuit or Euler path. Construct such a circuit when one exists. If it is does not, give an argument to show why no such circuit exist. (3 marks)

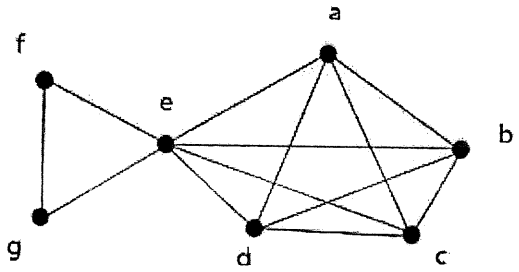

Figure 3

QUESTION 7

a) Draw an undirected graph based on the given information.

$V = \{a,b,c,d,e\}$ and $E = \{(a,b),(b,c),(c,d),(d,e)\}$

Determine whether the graph is a tree or not? (3 marks)

b) Given a degree sequence $2,2,2,1,1$. Decide whether it must always, must never, or could possibly be a degree sequence for a tree. Draw the graph to justify your answers. (3 marks)

a) Draw two spanning trees based on the graph in Figure 4. (6 marks)

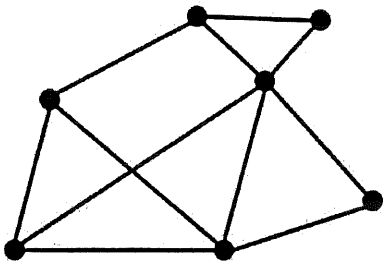

Figure 4

----------End of questions----------

FORMULA

$x^m \cdot x^n = x^{m+n}$	$\frac{x^m}{x^n} = x^{m-n}$
$(x^n)^m = x^{mn}$	$(xy)^n = x^n y^n$
$x^{1/n} = \sqrt[n]{x}$	$\sqrt[n]{xy} = \sqrt[n]{x}\sqrt[n]{y}$
$(x)^{-n} = \frac{1}{x^n}$	$x^{m/n} = \sqrt[n]{x^m}$
$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$	$\sqrt[n]{\frac{x}{y}} = \frac{\sqrt[n]{x}}{\sqrt[n]{y}}$
$\lvert x\rvert = \begin{cases} x & if\ x \geq 0 \\ -x & if\ x < 0 \end{cases}$	$\lvert x-a\rvert = \begin{cases} x-a & if\ x \geq 0 \\ -(x-a) & if\ x < 0 \end{cases}$
$\log_a xy = \log_a x + \log_a y$	$\log_a \frac{x}{y} = \log_a x - \log_a y$
$\log_a x^n = n\log_a x$	$\log_a a = 1$
$\log_a 1 = 0$	$\log_a (a)^x = x$
$T_n = a + (n-1)d$	$T_n = ar^{n-1}$
$S_n = \frac{n}{2}[2a + (n-1)d]$	$S_n = \frac{a(r^n - 1)}{r-1}$