



## UNIVERSITY COLLEGE TATI (UC TATI)

## FINAL EXAMINATION QUESTION BOOKLET

COURSE CODE	: BGE 1122
COURSE TITLE	: FUNDAMENTAL MATHEMATICS FOR COMPUTER SCIENCE
SEMESTER/SESSION	: 1-2022/2023
DURATION	: 3 HOURS

Instructions:

1. This booklet contains **6** questions in SECTION A, **3** questions in SECTION B and **3** questions in SECTION C. 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 7 PRINTED PAGES INCLUDING COVER PAGE**

**SECTION A (50 MARKS)****INSTRUCTION: ANSWER ALL QUESTIONS.****QUESTION 1**

Simplify the following.

a)  $\frac{25}{8(7-4)-3} + \frac{3(3)^2}{7-4}$  (4 marks)

b)  $-5 + \frac{19+20}{2(-5)} - (-2)$  (4 marks)

**QUESTION 2**

- a) Express 30 as a product of prime factors. (2 marks)
- b) Suppose a math class starts at the beginning of the school year with 12 boys and 8 girls. However, after school resumes on January, 6 new boys and 4 new girls came to the class. What is the latest ratio of boys to the total number of students in the class? (3 marks)

**QUESTION 3**

- a) Solve the following inequalities.

(i)  $10 - 7x < \frac{2-x}{2}$  (3 marks)

(ii)  $4(x-1) \leq 3(x+2)$  (3 marks)

b) Solve  $2^{2x} \times 8^{3x-1} = \frac{1}{4^{x+2}}$  (4 marks)

**QUESTION 4**

Find the value of  $x$  and give your answer to 3 decimal places.

a)  $3^x = 10$  (3 marks)

b)  $\log_3(x-1) = -2$  (3 marks)

**QUESTION 5**

Find the sum of the terms of each of the following arithmetic series.

a)  $3 + \frac{13}{3} + \frac{17}{3} + \dots + \frac{85}{3}$  (5 marks)

b)  $2, 7, 12, \dots, 47$  (5 marks)

**QUESTION 6**

From Figure 1 below,

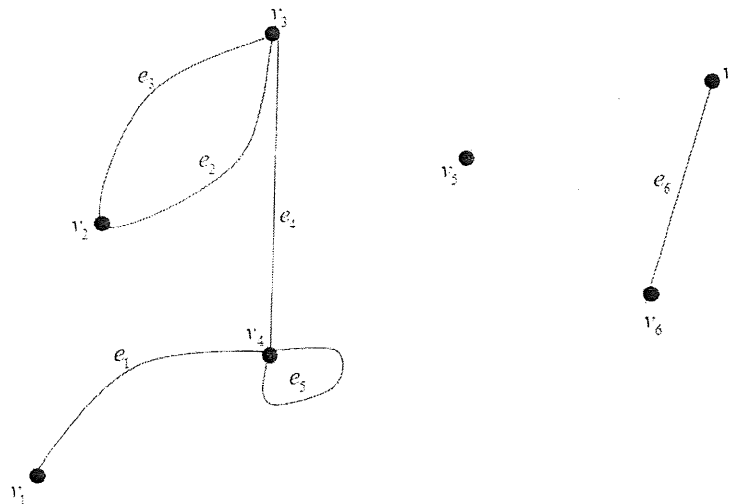


Figure 1

- a) Define the vertex sets and its edge set. (2 marks)
- b) List the isolated vertices. (1 mark)
- c) List the loops. (1 mark)
- d) List the parallel edges. (2 marks)
- e) List the vertices adjacent to  $v_3$ . (2 marks)
- f) Find all edges incident on  $v_4$ . (3 marks)

**SECTION B (30 MARKS)****INSTRUCTION: ANSWER ALL QUESTIONS.****QUESTION 1**

a) Solve the following logarithmic equation.

$$2\log_2(x+15) - \log_2 x = 6 \quad (9 \text{ marks})$$

b) Solve for x

$$2^{2x+1} - 17(2^x) + 8 = 0 \quad (8 \text{ marks})$$

**QUESTION 2**

Figure 2 shows a graph. Find:

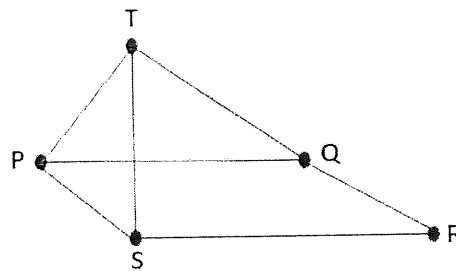


Figure 2

- a) the degree of each vertex. (5 marks)  
 b) the total degree of the graph. (2 mark)

**QUESTION 3**

Draw two trees based on Figure 3 below.

(6 marks)

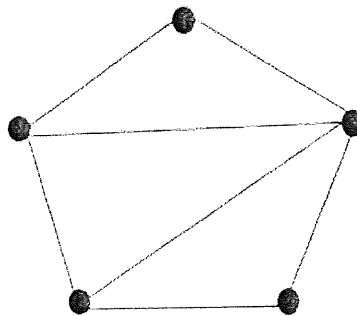


Figure 3

**SECTION C (20 MARKS)****INSTRUCTION: ANSWER ALL QUESTIONS.****QUESTION 3**

Figure 4 shows the distances, in m, between six shops in a town. A bread distributor has to send bread to all the shops starting from shop A and finishing at shop F.

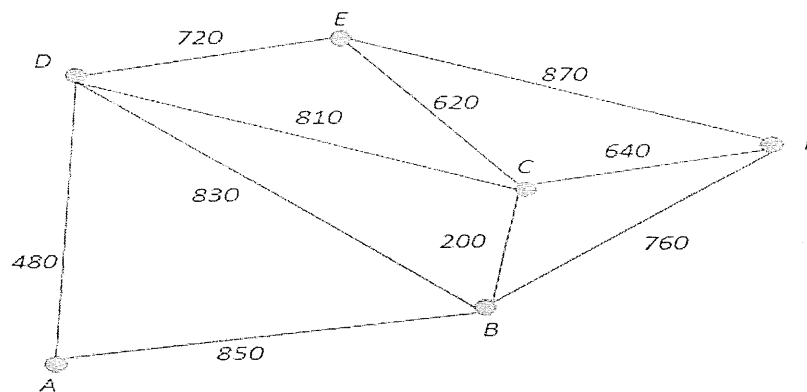


Figure 4

- a) State the shortest route the bread distributor can take from shop A to shop F with the condition all the shops are visited once only.

(3 marks)

- b) Based on (a), calculate the distance, in km, of the shortest route.

(2 marks)

**QUESTION 2**

The 3<sup>rd</sup> term of a geometric progression is 3 and the 6<sup>th</sup> term is  $\frac{3}{8}$ . Find the common ratio and the first term.

(5 marks)

**QUESTION 3**

In a class, the teacher asks every student to write an example of Arithmetic Progressions. Two friends Geeta and Madhuri write their progressions as  $-5, -2, 1, 4, \dots$  and  $187, 184, 181, \dots$  respectively. Find:

- a) the 34<sup>th</sup> term of progression written by Madhuri. (2 marks)
- b) the sum of the common difference between the two progressions. (2 marks)
- c) the 19<sup>th</sup> term of the progression written by Geeta. (2 marks)
- d) the sum of the first 10 terms of the progression by Geeta. (4 marks)

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-----END OF QUESTIONS-----

FORMULA	
$x^m \cdot x^n = x^{m+n}$	$(x^m)^n = (x)^{mn}$
$\log_a y = x \Rightarrow y = a^x$	$\log_a x^b = b \log_a x$
$\log_a \frac{x}{y} = \log_a x - \log_a y$	$\log_a xy = \log_a x + \log_a y$
$\log_a 1 = 0$	$\log_a (a)^x = x$
$T_n = a + (n-1)d$	$T_n = ar^{n-1}$
$S_n = \frac{n}{2} [2a + (n-1)d]$ $s_n = \frac{n}{2} (a+l)$	$S_n = \frac{a(1-r^n)}{1-r} \text{ for } r < 1$ $S_n = \frac{a(r^n - 1)}{r - 1} \text{ for } r > 1$

