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MECHANICAL PRODUCTION TECHNOLOGY LEVEL 5

ENG/OS/ME/CC/04/5

Apply Engineering Mathematics

July/August 2025

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**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)**

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WRITTEN ASSESSMENT

Time: 3 HOURS

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INSTRUCTIONS TO CANDIDATE

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1. This paper consists of **TWO** sections **A and B**.

2. Attempt **ALL** questions in section A and **ANY THREE (3)** questions in section B.

3. Marks for each question are indicated in the brackets.

4. Candidates are provided with a **answer booklet**.

5. Do not write on the question paper.

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This paper consists of FIVE printed pages

**Candidates should check the question paper to ascertain that all pages are printed as
indicated and that no questions are missing.**

SECTION A (40 MARKS)**Attempt ALL the questions in this section.**

1. Simplify the following Printed By: Technical And Vocational College Date: 05.08.2025 07:54 AM (4 Marks)

$$\log_a x^2 + 3\log_a x - 2\log_a 4x$$

2. Evaluate the following using law of indices

a. $\frac{2^3 \times 2^4}{2^7 \times 2^5}$ Printed By: Technical And Vocational College Date: 05.08.2025 07:54 AM (2 Marks)

b. $\frac{3^2}{3 \times 3^9}$ Technical And Vocational College Date: 05.08.2025 07:54 AM (2 Marks)

3. Simplify $\frac{p^{\frac{1}{2}} q^2 r^{\frac{2}{3}}}{p^{\frac{1}{4}} q^{\frac{1}{2}} r^{\frac{1}{6}}}$ and evaluate when $p=16$, $q=9$, $r=4$ (4 Marks)

4. A pedestrian notices that a tower is at a horizontal distance 30 m away from him and the angle of elevation is 35° . Find the height of the tower. (4 Marks)

5. Simplify the following equation (4 Marks)

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$$(x-2y)^2 - (2x-y)^2$$

6. Find the volume of a cylinder of length 15 cm and diameter 8 cm. (2 Marks)

7. Express in polar co-ordinates the position $(-4, 3)$. (3 Marks)

8. Calculate the surface area of a cylinder open at one end. Its radius is 10 cm and a height of 50 cm Printed By: Technical And Vocational College Date: 05.08.2025 07:54 AM (4 Marks)

9. A force of 5 N is inclined at an angle of 45° to a second force of 8 N, both forces acting at a point. Calculate the magnitude of the resultant of these two forces with respect to the 8 N force. Printed By: Technical And Vocational College Date: 05.08.2025 07:54 AM (3 Marks)

10. If, $(2x+1)^2 + (x-1)(x-3) = ax^2 + b$, determine the values of a and b Printed By: Technical And Vocational College Date: 05.08.2025 07:54 AM (4 Marks)

11. Determine the standard deviation from the mean of the following set of numbers;

5,6,8,4,10,3, correct to 4 significant figures Printed By: Technical And Vocational College Date: 05.08.2025 07:54 AM (4 Marks)

SECTION B (60 MARKS)

Attempt any THREE questions in this section

12.
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a. Determine the angle between vectors $2i - j + 3k$ and $i + 3j - k$

(5 Marks)

b. Use elimination method to solve the simultaneous equation below

(7 Marks)

$3x + 4y = 5$

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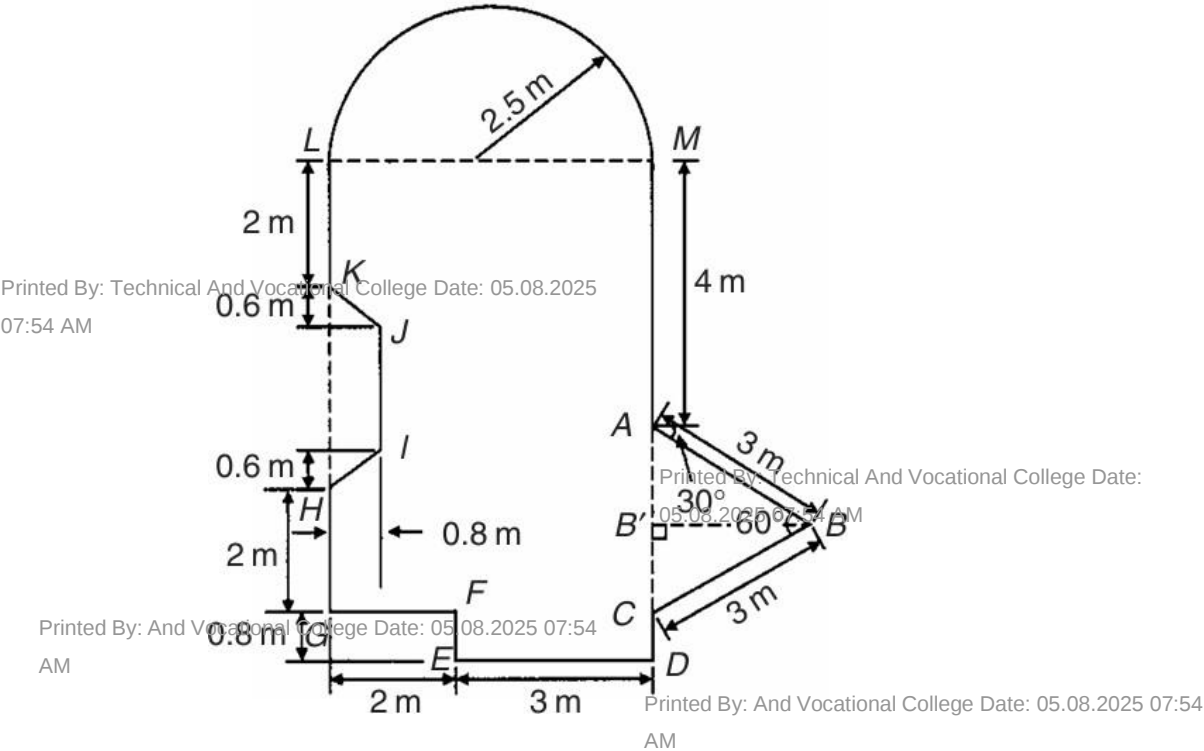
$2x - 5y = -12$

c. The figure below shows a plan of a floor of a building which is to be carpeted.

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Calculate the area in square meters.

(8 Marks)



13.
- a. Given matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 6 & 5 & 4 \end{bmatrix}$

(5 Marks)
- b. The table below shows the marks scored by 50 engineering students in a mathematics test

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Marks	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No. Of students	2	3	7	12	15	7	3	1

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15.

a. Prove that;

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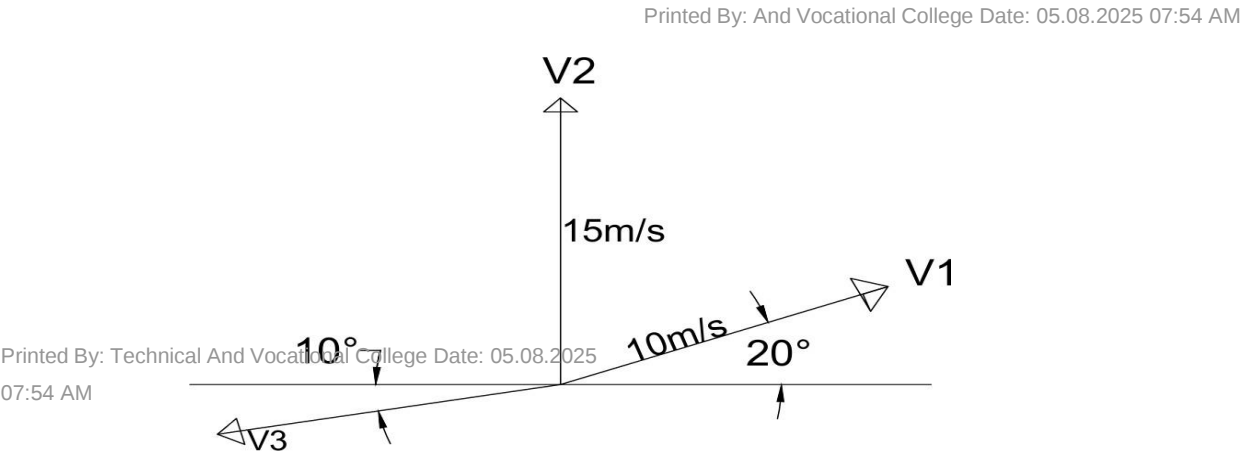
$$\frac{1+\cot\theta}{1+\tan\theta} = \frac{\cos\theta}{\sin\theta}$$

(4 Marks)

b. Calc the three velocities given in the diagram below

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(8 Marks)



c. Use matrix method to solve the following simultaneous equation

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$$\begin{aligned} 3x - 5y - 7 &= 0 \\ 4x - 3y - 19 &= 0 \end{aligned}$$

(8 Marks)

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