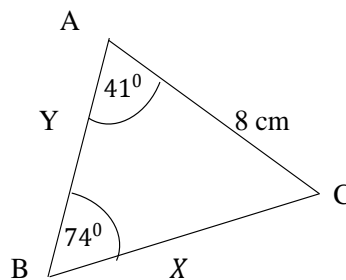


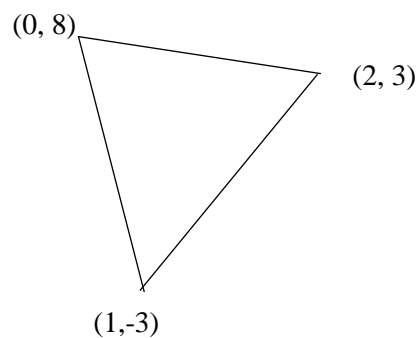
<b>Tertiary and Vocational Education Commission</b>		
<b>Diploma in Construction Technology</b>		
<b>NVQ Level 05 – Semester I</b>		
<b>Mathematics for Construction Technology</b>	<b>F45C002M01</b>	<b>Three Hours</b>
<b>Answer any five (05) questions only</b>		

- (01) (a) Using distance formula, show that the points  $(-3,2)$   $(1,-2)$   $(9, -10)$  are Collinear **(Marks - 06)**  
 (b) Using sine rule and cosine rule, find the length of X and Y in the below triangle



**(Marks - 06)**

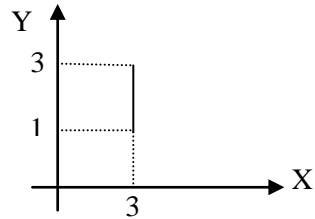
- (c) The vertices of triangle are given below. Prove that whether the triangle is equilateral, isosceles or scalene triangle



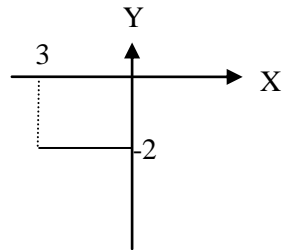
**(Marks - 06)**

(d) Find the gradient of below lines

(i)



(ii)



**(Marks - 02)**

(02) (a) Find the integration of below functions

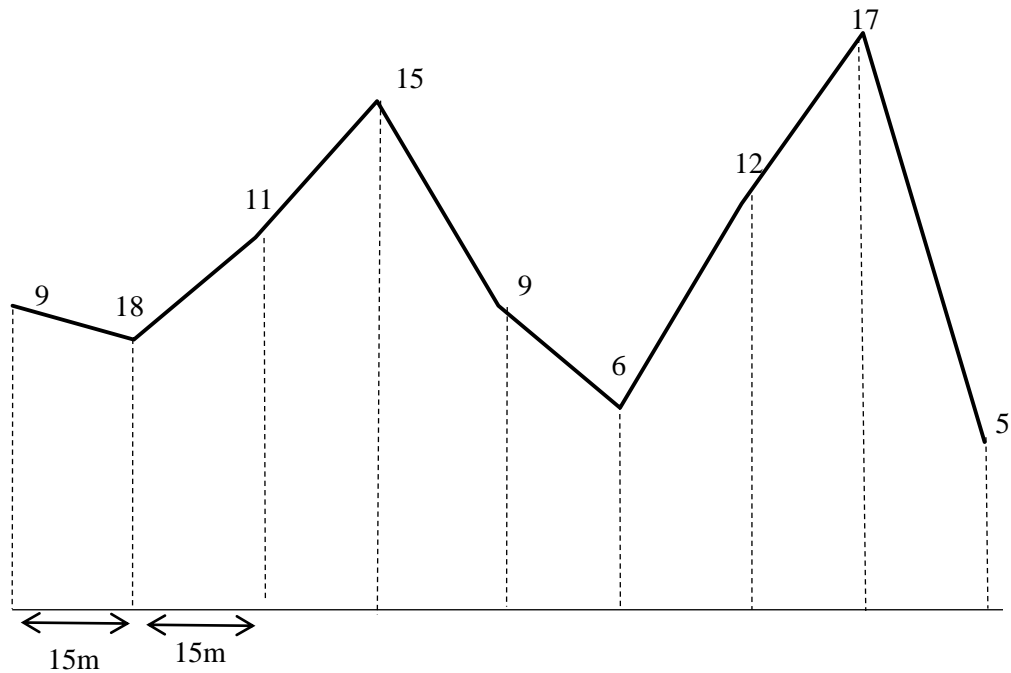
(i)  $\int 10x^4 - 3x - 20 \, dx$

(ii)  $\int x^{-\frac{1}{2}} \, dx$

(iii)  $\int 3 \operatorname{cosec}^2 x + \frac{1}{x} \, dx$

**(Marks - 07)**

(b) The following offset were taken in chain survey in an irregular boundary. The interval between offsets throughout the irregular boundary is 15 m. Calculate area of irregular boundary using Simpson rule.



(Marks - 13)

(03) (a) Find the differentiation of

(i)  $y = x + \sqrt{x}$

(ii)  $y = \frac{x-3}{\sqrt{x}}$

(iii)  $y = (e^x + 5x)(3x + 2)$

(Marks - 08)

(b) Find each limit

(i)  $\lim_{x \rightarrow \infty} \left( \frac{1 - x^{-2} + 13x^2}{5x - 27x^2} \right)$

(ii)  $\lim_{x \rightarrow 3} \left( \frac{\frac{1}{x} - \frac{1}{3}}{x - 3} \right)$

(Marks - 05)

(c) Show that the limit does not exist

$$\lim_{x \rightarrow 1} \frac{x^2 + 2x - 3}{|x - 1|}$$

(Marks - 07)

(04) (a) Solve the following equations

(i)  $5(x - 8) = 3(x - 2)$

(ii)  $2x + 3y = 14$

$3x + 2y = 26$

**(Marks - 06)**

(b) A rectangle has a width of  $x$  cm and the height is 3 cm higher than its width

(i) Write the expression for perimeter of the rectangle

(ii) If perimeter is 18 cm find the width of rectangle

**(Marks - 06)**

(c) Solve below Quadratic equations

(i)  $x^2 - 6x - 16 = 0$

(ii)  $(x - 9)(x - 7) = 43 - 7x$

**(Marks - 08)**

(05) (a)  $A = \begin{bmatrix} -2 & 1 & 5 \\ 0 & -1 & 2 \\ 3 & 0 & 1 \end{bmatrix}$        $B = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 2 & 0 \\ -1 & -3 & 4 \end{bmatrix}$

Find the value for the below

(i)  $3A + B$

(ii)  $A - 2B$

(iii)  $BA$

**(Marks - 05)**

(b) Find the X and Y value

$$\begin{bmatrix} 2x - y & 3 & 10 \\ y + 1 & -2 & 0 \end{bmatrix} = \begin{bmatrix} 19 & 3 & 10 \\ 0 & -2 & 0 \end{bmatrix}$$

**(Marks - 05)**

(c) Find the determinant of the following matrixes

(i)  $A = \begin{bmatrix} 8 & 1 \\ -1 & 4 \end{bmatrix}$

(ii)  $B = \begin{bmatrix} 0 & 3 \\ -2 & 5 \end{bmatrix}$

**(Marks - 04)**



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(d)  $A = \begin{bmatrix} 2 & 3 \\ 2 & 4 \end{bmatrix}$      $B = \begin{bmatrix} 2 & -3/2 \\ -1 & 1 \end{bmatrix}$

Prove that B is the inverse matrix of A

**(Marks - 06)**

(06) (a) (i) Write the general rules for graphical representation of data

**(Marks - 04)**

(ii) Explain the upper and lower control limits on a control chart using suitable sketch?

**(Marks - 04)**

(b) A survey on the heights (in cm) of 50 girls in a class X was conducted at a school and the following data were obtained

Height (in cm)	Number of girls
120 - 130	2
130 - 140	8
140 - 150	12
150 - 160	20
160 - 170	8
<b>Total</b>	<b>50</b>

Find the mean, median and mode of the above data

**(Marks - 08)**

(c) If  $\cos\theta = 4/5$  ( $0 < \theta < \pi/2$ ), find the  $\sin\theta$ ,  $\tan\theta$ ,  $\operatorname{cosec}\theta$ ,  $\cot\theta$ ,  $\sec\theta$  values

**(Marks - 04)**