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Diploma in Construction Technology		
NVQ Level 05 – Semester I		

Mathematics for Construction Technology

F45C001M01

Three Hours

Answer all questions

INSTRUCTIONS:

You are not allowed to use any kind of electronic devices such as calculators etc. during the examination.

QUESTION -01

a) – Solve the following quadratic and linear equations by **factorizing**.

I. $6x^2 - 11x + 4 = 0$

II. $5y(y - 2) + 3y(y + 2) - 11 = 7y - 14$ (Marks-2x2=4)

b) - Solve these equations by **completing square**.

I. $x^2 + 6x + 5 = 0$

II. $2x^2 + 12x - 16 = 0$ (Marks-2x2=4)

c) – Multiplying and dividing -

I. $\frac{x^2y^2-4y^3}{xy^3} \times \frac{2xy}{x^2+4y}$

II. $\frac{c^2-16}{c^2-8c+16} \div \frac{2c+8}{3c-12}$ (Marks-2x2=4)

d) – Identify the metrices shown below,

I. $\begin{bmatrix} 4 & 2 \\ 9 & 5 \end{bmatrix}$

II. $\begin{bmatrix} 8 & 2 \end{bmatrix}$

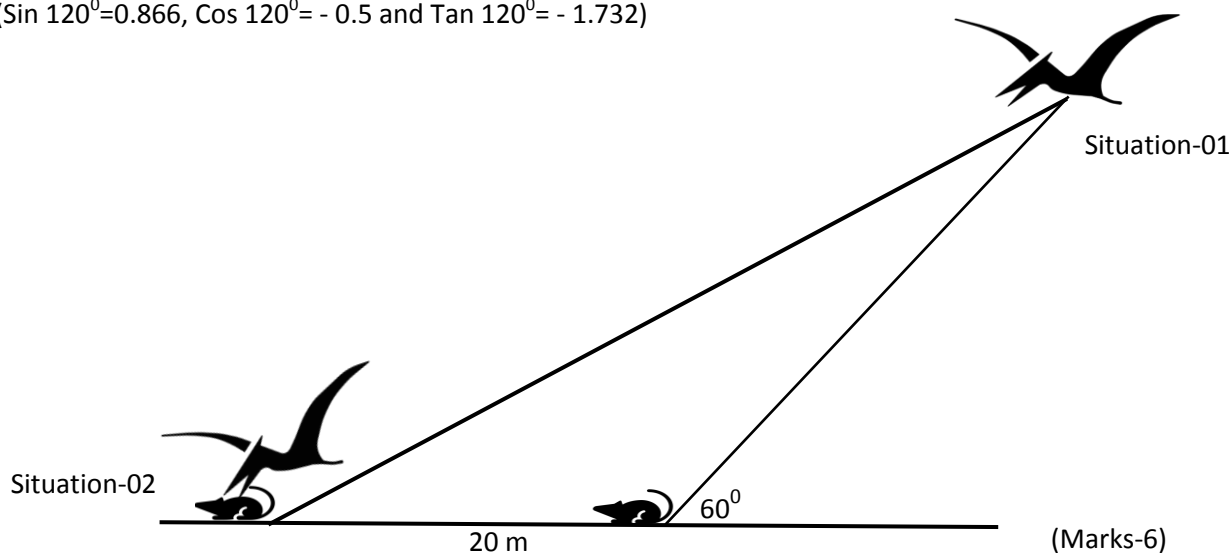
III. $\begin{bmatrix} 3 \\ 1 \end{bmatrix}$

IV. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (Marks-2x4=8)

QUESTION -02

a) – If the perpendicular distance between the Earth and a bird at “situation-01” is $30\sqrt{3}m$, the mice has seen by the bird, Find the bird’s flying distance between “situation-01” and “situation-02”.

($\sin 120^\circ = 0.866$, $\cos 120^\circ = -0.5$ and $\tan 120^\circ = -1.732$)

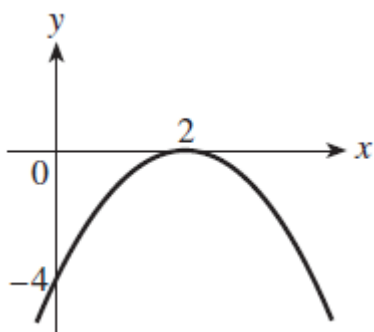


b)-

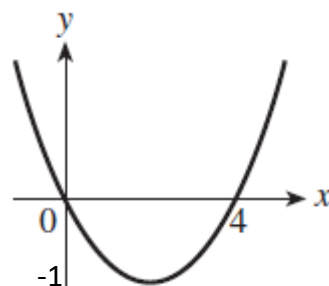
- I. Draw a graph for the equation $y = x^2 - 2x - 1$ using x values between -4 to +6. (Marks-4)
- II. Find the coordinates where the graph intersects the X-axis. (Marks-2)
- III. Find the equation of line of symmetry. (Marks-1)
- IV. Maximum or minimum point of the graph. (Marks-1)

c) – Find the equation of two graphs shown below.

i)-



ii)-



(Marks-3x2=6)

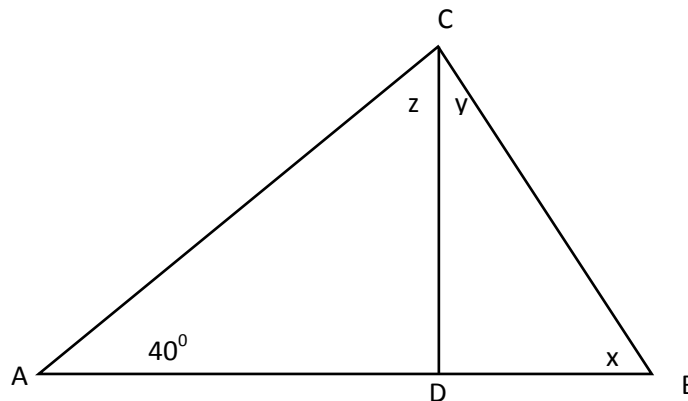
QUESTION -03

a)- A class teacher randomly selected a student from the class and asked to guess two different positive numbers without informing them. Also, teacher instructed the student about the relationships between those two numbers,

1. Summation of square of small number with the large number is 9.
2. Difference of two numbers is 3.

Make two simultaneous equations and find the original numbers. (Marks-6)

b)- ADC and BCD triangles are right angle triangles in below figure. Both ACB and BDC angles are 90° and DC side perpendicular to the AB side. Find the values of x, y and z angles.

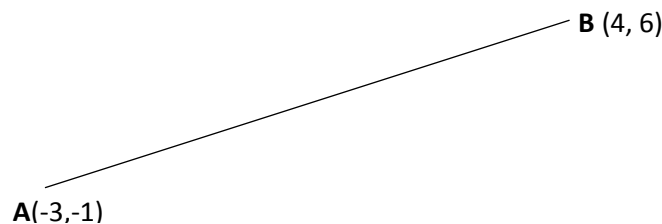


(Marks-2x3=6)

c) – i)- Calculate the length of AB line segment.

ii)- Find the gradient of the AB line.

(Marks-2x2=4)



d) – Write down the standard equation patterns for,

i)- Quadratic expressions

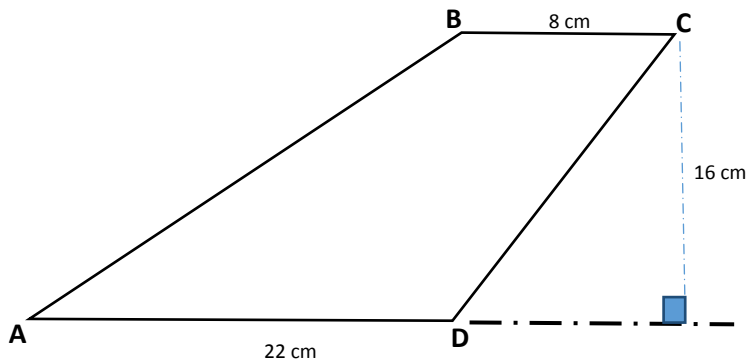
ii)- Straight line

(Marks-2x2=4)

QUESTION -04

a) – There is a water tank with 450 mm radius and 1500 mm height. Find, how many times need to fill the water tank up to top level by using 250 mm radiused spherical shaped pot? (Marks-3)

b) – Calculate the area of ABCD figure below, (BC//AD)



(Marks-3)

c) – Solve the following differential and integral functions,

I. $\frac{dy}{dx} ; y = 3\cos x / 5x^3$

II. $\frac{dy}{dx} ; y = 4x(4x^2 + 2) \cdot \sin 2x$

(Marks-3x2=6)

d) – Differentiate the following functions with respect to the variables.

I. $f(x) = 3x^2 + 6x + \frac{1}{3x^2} - \frac{3}{x^3} - \frac{4}{3}\sqrt{x^2} + 7$

(Marks 4)

II. $f(p) = \sqrt[3]{8p^3} + 4p^2 - \frac{6p}{3} - \frac{7}{5p} + 299$

(Marks 4)

QUESTION -05

a) - The distribution of the sales in a month (in 1000 of rupees) of the salesmen of a large firm as follows,

Sales (Rs.1000)	Number of salesmen
20 – 29	3
30 - 39	5
40 – 49	7
50 – 59	10
60 - 69	6
70 – 79	5
80 - 89	4

- I. Find the **Mean**, (Marks-4)
- II. **Mode** and (Marks-4)
- III. **Median** of the sales. (Marks-4)

b) – Draw a Histogram on a graph sheet provided and find the **Mode**. Compare your answer with the value taken from manual calculation. (Marks-8)