SECTION A
Answer all the questions.

Question 1 **[2 × 10 = 20]**

(i) If the product matrix is 4 × 2, then the dimensions of the multiplied matrices are

A 4×1 and 1×2

B 4×4 and 3×2

C 1×4 and 2×3

D 4×4 and 2×2

Answer……..

(ii) Mr. Sangay is a sales representative. His salary is Nu 3000 per month plus an additional 5% commission on the total sales. Find Sangay's total income for a month if the total sales were Nu 50,000?

A Nu 3500

B Nu 4500

C Nu 5500

D Nu 6500

Answer……..

(iii) Which of the following relation is a function?

A {(0,3) (0,4) (1,5)}

B {(A,X) (A,Y) (C,Y)}

C {(△ , □) (△ , ▭) (○ ,□)}

D {(0,a) (1,a) (2,b)}

Answer……..

(iv) What is x as a function of y for the equation $x + 2y = 5$?

A $f(y) = 5 - 2x$

B $f(y) = 5 - 2y$

C $f(x) = 5 + 2x$

D $f(x) = 5 + 2y$

Answer……..

(v) The total surface area of a sphere is 154cm^2. Find its radius.

A 5.5cm

B 4.5cm

C 3.5cm

D 2.5cm

Answer……..

(vi) The zeros of the equation $(x-3)(x+2) = 0$

A $x = -3, +2$

B $x = 3, 2$

C $x = 3, -2$

D $x = -3, -2$

Answer……..

(vii) Which of the following equations of the graph intersects at x-axis?

A $y = 4x^2 - 3x + 1$

B $y = 2x^2 + 4x + 2$

C $y = x^2 + 4x + 4$

D $y = 2x^2 - x - 3$

Answer……..

(viii) If a pair of dice is rolled twice, the probability of getting two 4's is

A $\frac{1}{36}$

B $\frac{1}{8}$

C $\frac{1}{16}$

D $\frac{1}{24}$

Answer……..

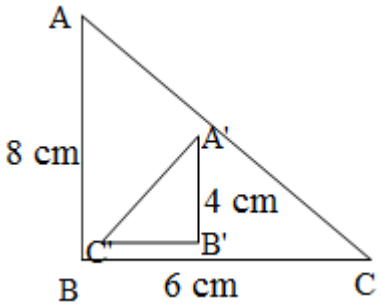
(ix) Mr. Karma wants to reduce a right angle triangle design as shown here to decorate the classroom for the annual school fete day. He uses dilation as shown below. How long is the side $A'C'$?

A 3cm

B 4cm

C 5cm

D 6cm



Answer……..

(x) Find the value of ' x ' for $\tan x = 0.9$

A $\approx 0.02^\circ$

B $\approx 42^\circ$

C $\approx 44^\circ$

D $\approx 80^\circ$

Answer……..

Section B [32 marks]

Answer all questions

Question 2

Draw two different digraphs for this adjacency matrix. **[3]**

$$\begin{bmatrix} 1 & 2 & 2 \\ 0 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$$

Question 3

A man buys Nu 50 face value shares at a premium of 20%. The company gives 12% dividend rate. Find: **[4]**

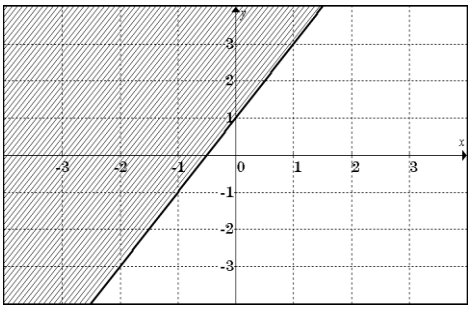
(i) the market value of 320 shares.

(ii) annual income.

(iii) the yield percent.

Question 4

Write an inequality equation for the given graph. **[3]**



Question 5

Write at least three numbers for each: **[3]**

(i) Less than 0.5 with 3 significant figures.

(ii) Greater than $\frac{1}{5}$ with 2 significant figures.

Question 6

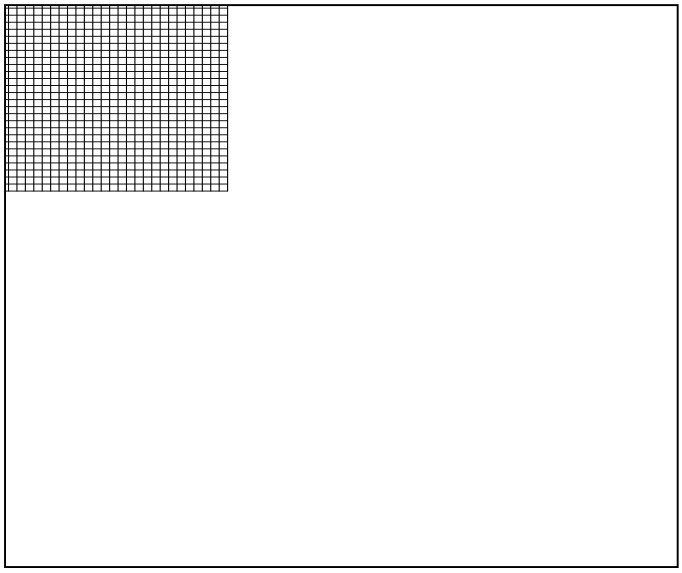
For the given quadratic function $f(x) = x^2 - 6x + 7$ **[5]**

(i) Change the quadratic function into vertex form.

(ii) Write the x-intercepts.

(iii) Write the coordinates of the vertex.

(iv) Sketch the graph.



Question 7

The following are the number of rice bags sold by 21 shops in Thimphu in a month. **[3]**

71	63	99	90	92	49	80
40	97	92	94	56	70	39
99	83	84	50	53	41	68

(i) Use the data to find the 5 number summaries.
(ii) Construct a box and whisker plot of the data**.**
(iii) What conclusion can you draw from the box plot?

Question 8

In a mathematics class, 20 students have forgotten to bring rulers, and 17 have forgotten their pencils, 13 of them have forgotten both pencils and rulers. Find the total number of students by using a suitable diagram. **[3]**

Question 9

Find all the trigonometric ratios for angle 65^{o} . **[2]**

Question 10

Create a triangle such that one angle is acute and $\tan A = \frac{3}{4}$. Find the value of cos A. **[2]**

Question 11

Create a 2 D shape with 6 lines of symmetry. **[2]**

Question 12

Do you think "2D shape with rotational symmetry will also have reflectional symmetry"? Justify your answer using examples. **[2]**

Section C (6 × 8 = 48 marks)

Under this section, there are 8 questions (question 13 – 20).
Each question has two parts, I and II. Attempt either I or II from each question.

Question 13 (I)

(a) If $A=\begin{bmatrix}1 & 2\\ 0 & 0\end{bmatrix}, B=\begin{bmatrix}3 & 3\\ 4 & 0\end{bmatrix}$ and $C=\begin{bmatrix}1 & -1\\ 0 & 1\end{bmatrix}$ **[3]**

Find

(i) $A(B+C)$

(ii) $AB+AC$

(iii) Show that $A(B+C)=AB+AC$

(b) Classify the following matrices as **[3]**

$$A=\begin{bmatrix}1 & 0\\ 1 & 0\end{bmatrix}, B=\begin{bmatrix}1\\ 0\end{bmatrix}, C=\begin{bmatrix}1 & 2\end{bmatrix}, D=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}, E=\begin{bmatrix}2 & 0\\ 0 & 3\end{bmatrix}, F=\begin{bmatrix}1 & 2 & 3\\ 0 & 1 & 0\end{bmatrix}$$

(i) Square matrix
(ii) Row matrix
(iii) Column matrix
(iv) Identical matrix
(v) Diagonal matrix
(vi) Rectangular matrix

OR

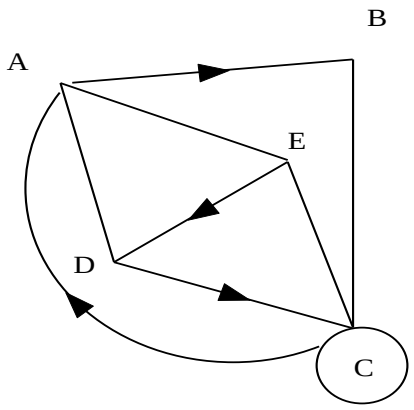
Question 13 (II)

(a) Find the possible orders for the matrix, if it has **[3]**

(i) 7 elements in total.

(ii) 6 elements in total.

(b) From the given digraph, find how many two stopover paths are there from B to E. **[3]**
What are they?



Question 14 (I)

(a)

Solve **[2]**

$$\frac{\sqrt{5}\times\sqrt{18}}{\sqrt{10}}+\frac{\sqrt{32}}{\sqrt{8}}$$

(b) A man borrows Nu 22,500 at 10% p.a. compounded annually. He repays Nu 11,250 at the end of the first year and Nu 12,550 at the end of 2^{nd} year. Find the amount of loan at the end of the third year. **[4]**

OR

Question 14 (II)

(a) What is the value of $\sqrt{42+\sqrt{49}}$? **[2]**

(b) Mr. Kinzang purchases a car at Nu 700,000. He must pay a 40% down payment but can borrow the rest from the bank. The bank charges an interest rate of 12% p.a. compounded monthly on the loan. He pays Nu 8000 every month. Find the balance amount at the end of 2^{nd} month. **[4]**

Question 15 (I)

(a) Is $(0,0)$ a solution of $10x - 3y < 60$? Show your work. **[2]**

(b) Find the equation of the line passing through $A(0,2)$ and $B(-2,0)$. **[4]**

OR

Question 15 (II)

(a) Without graphing, find the point of intersection for the system of equations. **[3]**

$$-2x + 7y = 4$$
$$-3x + 5y = -5$$

(b) The sum of two numbers is 7. The difference of five times the first number and three times the second number is 3. Find the two numbers? **[3]**

Question 16 (I)

(a) Round off the following numbers as indicated. **[3]**

(i) 11.58575 to 4 SF

(ii) 0.005633 to 2 SF

(iii) 192.77 to 3 SF

(b) A piece of wire is bent into a square of side 11cm. The same wire is then bent into a circle. Calculate the radius of the circle. **[3]**

OR

Question 16 (II)

(a) Write the significant figure for the given numbers. **[3]**

(i) 2.07

(ii) 0.702

(iii) 24.06

(iv) 0.1040

(v) 1.0030

(vi) 20.34

(b) Determine the height of a triangle based prism with the base area of $30\,cm^2$ and volume $450cm^3$. **[3]**

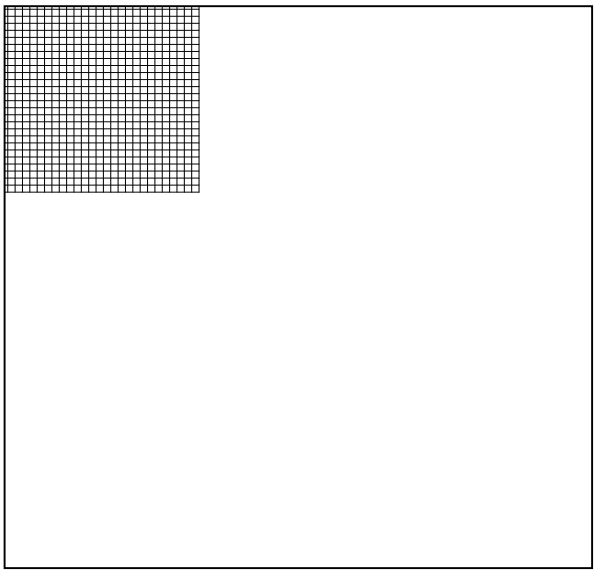
Question 17 (I)

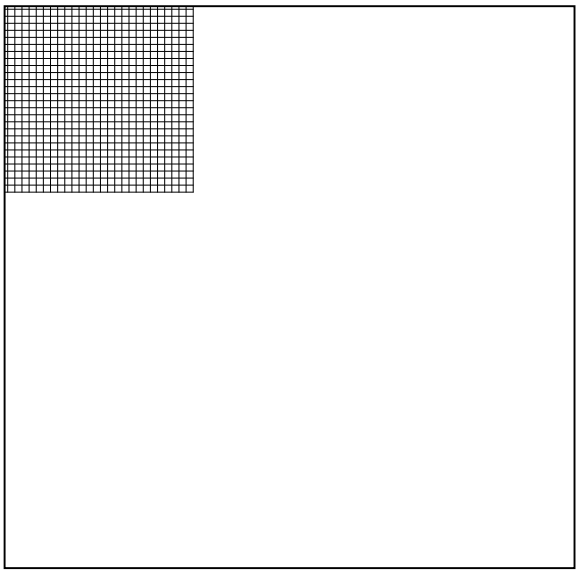
(a) The length of the sides of a right triangle are $2x-1,\ 2x$ and $2x+1$. Find x. **[3]**

(b) Sketch the graph, if $f(x) = |x|$. **[3]**

(i) $f(2x-3)$

(ii) $f(0.5x+4)$





OR

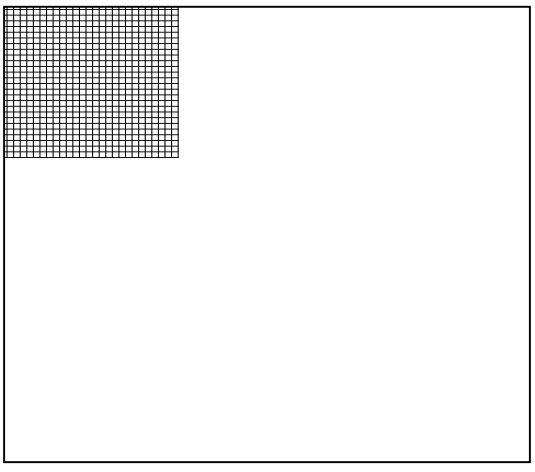
Question 17 (II)

(a) Solve for x **[2]**

$$6x^2 - 6 + 5x = 0$$

(b) Graph the function **[4]**

$$f(x) = \frac{1}{5}(x-1)^2 + 1$$



Question 18 (I)

a) The following table shows the weights in grams of a sample of 100 potatoes taken from a large consignment: **[3]**

Weights in gms	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130
Frequency	8	10	12	16	18	14	12	10

(i) Draw a histogram for the above information.

(ii) Make three conclusions based on the above data.

b) A bag contains one black ball and two white balls. A drawing from the bag consists of taking a ball from the bag and keeping it out if the ball is white, and putting it back if it is black.

Calculate the probabilities that

(i) The first drawing is a white ball.

(ii) The second drawing is a white ball**.** **[3]**

OR

Question 18 (II)

(a) The table shows the age of a sample of people and how many hours each person engages in physical activity each week.

Age	18	20	22	26	28	30	34	35
hours	16	15	11	14	11	9	6	4

(i) Create a scatter plot of the data.

(ii) What type of correlation is shown?

(iii) Is a line of best fit appropriate? Explain. **[4]**

(b) Zangmo took two tests. The probability of her passing both test is 0.6. The probability of her passing the first test is 0.8. What is the probability of her passing the second test given that she has passed the first test? **[2]**

Question 19 (I)

(a) Find the value of **[2]**

(i) $\sin 30^\circ + \tan 45^\circ - \cos 60^\circ$

(ii) $\sin^2 45^\circ + \tan^2 45^\circ - \cos^2 30^\circ$

(b) A kite attached to a string inclined at 60^o to the horizontal is being flown at a height of 75 m from a level ground. Find the length of the string to the nearest meter. **[4]**

OR

Question 19 (II)

(a) Two poles having heights of 6m and 11m are fixed on a plane ground. If the distance between their bases is 12m apart, find the distance between their tops. **[3]**

(b) Nima stood 15m from a prayer flag pole and looked up to the top of the pole at an angle of 50°. Nima's eyes are 1.8m above the ground. How tall is the pole? **[3]**

Question 20 (I)

(a) How many axes of rotation are there for a square base pyramid? Use a diagram to support your answer. **[2]**

(b) Construct ΔXYZ where $\mathrm{XY} = 8cm, \angle x = 80^{\circ} and \angle y = 36^{\circ}$ and draw an in-circle. **[4]**

OR

Question 20 (II)

(a) Fill the blanks **[2]**

(i) The point of intersection of the altitudes is called……

(ii) The centre of gravity of a triangle is called ……

(b) Find the area of a triangle xyz in which $xy = \frac{1}{2} xz$ and angle $x = 45^{\circ}$. **[4]**