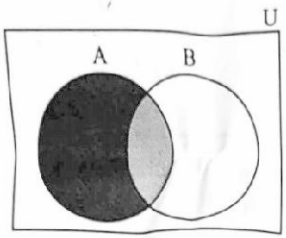
Answer any 6 questions from 1 to 8. Each carries 3 scores. $(6 \times 3 = 18)$

1. (i) The shaded region in the given Venn diagram is (1)



(a) A' (b) $B - A$

(c) $A - B$ (d) B'

(ii) If $A = \{-1, 0, 1\}$, write all subsets of the set A. (2)

2. (i) If $(x - 1, y + 2) = (2, 1)$, then the value of x and y are _____. (1)

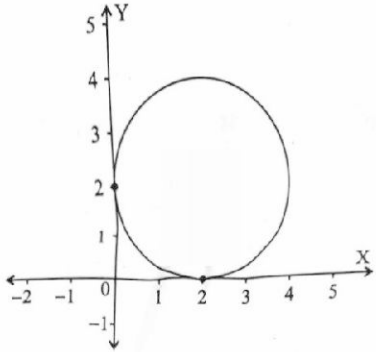
(ii) If $A = \{0, 1\}$, write $A \times A \times A$. (2)

3. Find the number of arrangements of the letters of the word 'MATHEMATICS'. How many of these start with H ?

4. (i) Name the octant in which the point $(4, -5, 6)$ belongs. (1)

(ii) Find the distance between the points $A(2, 3, 5)$ and $B(4, 3, 1)$. (2)

5. Consider the following circle :



(i) Write the centre of the circle. (1)

(ii) Find the equation of the circle. (2)

6. (i) $\lim_{x \to 0} \frac{\sin x}{x} =$ _____. (1)

(ii) Evaluate $\lim_{x \to 0} \frac{\sin ax + bx}{ax}$. (2)

7. If $y = \frac{x-1}{x+2}$, then find $\frac{dy}{dx}$.

8. Consider the data :

5, 7, 6, 9, 4, 11, 8, 6

(i) Find the mean for the data. (1)

(ii) Also find the Mean Deviation about its Mean. (2)

Answer any 6 questions from 9 to 16. Each carries 4 scores. $(6 \times 4 = 24)$

9. (i) $A \cup A' =$ _____. (1)

(ii) If $U = \{1, 2, 3, 4, 5, 6\}$, $A = \{2, 3, 4\}$ and $B = \{3, 4, 6\}$, then verify that $(A \cup B)' = A' \cap B'$. (3)

10. (i) Draw the graph of the function, $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = |x - 2|$. (2)

(ii) Find the domain and range of $f(x) = \frac{x-3}{x-4}$. (2)

11. (i) Show that $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = -\frac{1}{2}$. (2)

(ii) Prove that $\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$ (2)

12. (i) Find the multiplicative inverse of the complex number $z = 3 - 4i$. (2)

(ii) Express the complex number $\frac{1+i}{1-i}$ in $x + iy$ form. (2)

13. (i) Solve the linear inequality $\frac{2x-1}{3} \leq \frac{3x+2}{4}$. (3)

(ii) Represent the solution in real line. (1)

14. (i) ${}^nC_r =$ _____. (1)

(a) $\frac{n!}{r!}$ (b) $\frac{n!}{r!(n-r)!}$

(c) $\frac{n!}{(n-r)!}$ (d) $\frac{(n-r)!}{r!}$

(ii) In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl if each cricket team of 11 must include exactly 4 bowlers ? (3)

19. Consider the following data :

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

(i) Find the mean. (2)

(ii) Find the variance. (3)

(iii) Find the Standard Deviation. (1)

20. (i) If two events A and B such that $P(A) = \frac{2}{5}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{5}$, then find $P(A \cup B)$. (2)

(ii) A bag contains 8 red and 5 white balls. Three balls are drawn at random. Find the probability that (4)

(a) All the three balls are white

(b) All the three balls are red

(c) One ball is red and two balls are white