	Section A	
1	Number of proper subsets of a set containing 4 elements is A) 4^2 B) 4^2-1 C) 2^4 D) 2^4-1	[1]
2	The set builder form of $\{-2,0,2\}$ is A) $\{x:-2\leq x\leq 2, x\in R\}$ B) $\{x:x \text{ is a solution of the equation } x^3-4x=0\}$ C) $\{x:x \text{ is a solution of the equation } x^2=4\}$ D) $\{x:x\in Z,\ x^2-2\leq 0\}$	[1]
3	Let $M=\{x:x \text{ is a vowel in the word 'EQUALITY'}\}$ and $N=\{x:x \text{ is a vowel in the word 'QUANTITATIVE'}\}$. Choose the correct answer. (i) $M\cup N=\{E,A,U,I\}$ (ii) $M\cap N=\{E,Q,A,U,I,T\}$ (iii) $M=N$ (iv) $M-N=\{L,Y\}$ A) (i), (ii) B) (ii), (iv) C) (ii), (iii) D) (i), (iii)	[1]
4	Let $A=\{3,5\}$ and $B=\{7,11\}$ and $R=\{(a,b):a\in A, b\in B, a-b \text{ is odd}\}$ then A) $R=A\times B$ B) $R=\emptyset$ C) $R\subset A\times B$ D) $R\subset B\times A$	[1]

5	The value of $\sin(45^\circ + \theta) - \cos(45^\circ - \theta)$ is A) $2\cos\theta$ B) $2\sin\theta$ C) 1 D) 0	[1]
6	If the radius of a circle is 50cm, then find the angle subtended by an arc of 22cm length at the centre of the circle is A) 22°12′ B) 25°2′12″ C) 25°12′ D) 22°14′	[1]
7	The value of $\sec\left(\frac{-25\pi}{3}\right)$ is A) $\frac{2}{\sqrt{3}}$ B) $\sqrt{2}$ C) 2 D) 1	[1]
8	If $-\frac{1}{3} \le \frac{x}{2} - \frac{4}{3} < \frac{1}{6}$ then $x \epsilon$ A) [2,3) B) [1,3) C) [2,6) D) [0,3)	[1]
9	The 3rd term of GP is 4. The product of its first 5 terms is A) 4^3 B) 4^4 C) 4^5 D) 4^2	[1]
10	The first term of a G.P with real terms is 1. If the sum of its third and fifth terms is 90, then the common ratio of the G.P is A) $\sqrt{10}$ B) -10 C) ± 3 D) ± 9	[1]
11	The value of $7^{\frac{1}{2}} \times 7^{\frac{1}{4}} \times 7^{\frac{1}{8}} \times \ldots\ldots\ldots$ to infinite terms is A) 7 B) $\frac{1}{7}$ C) 49 D) 343	[1]
12	The sum to infinity of the G.P whose first term is 28 and fourth term is $\frac{4}{49}$ is A) $\frac{197}{6}$ B) $\frac{98}{3}$ C) $\frac{1}{6}$ D) $\frac{2}{3}$	[1]
13	If $\lim_{x\to 0} \frac{x^n - 2^n}{x-2} = 80$, then the value of n is A) 2 B) 3 C) 4 D) 5	[1]
14	Let $R = \{(x,y): x, y \epsilon Z, y = 2x - 4\}$. If $(a,-2)$ and $(4,b^2)$ belongs to R, then the values of a and b are A) $1, \pm 2$ B) $\pm 1, 2$ C) $1, 1$ D) $2, 1$	[1]
15	If $\tan\theta = \frac{1}{2}$ and $\tan\emptyset = \frac{1}{3}$, then the value of $\theta + \emptyset$ is A) $\frac{\pi}{6}$ B) π C) 0 D) $\frac{\pi}{4}$	[1]

16	The coordinates of a point on x-axis which is equidistant from the points $P(2,2,2)$ and $Q(5,3,4)$ A) $(9,0,0)$ B) $\left(\frac{49}{6},0,0\right)$ C) $\left(-\frac{49}{6},0,0\right)$ D) $\left(0,0,\frac{49}{6}\right)$	[1]
17	If $x^2+y^2=1$, then the distance of a point $\left(x,y,\sqrt{1-x^2-y^2}\right)$ from the origin is A) 1 B) 2 C) x D) y	[1]
18	The three axes OX, OY, OZ determine A) 2 coordinates planes B) 3 coordinates planes C) 1 coordinate plane D) 8 coordinates planes	[1]
19	**Assertion (A):** If the ordered pairs (x^2-4x, y^2-y) and $(-4,6)$ are equal, then $x=2$ and $y=-2,3$ **Reason (R):** $(a,b)=(c,d)$ *if and only if* $a=c$ *and* $b=d$ A) Both A and R are true and R is the correct explanation of A. B) Both A and R are true but R is not the correct explanation of A. C) A is true but R is false. D) A is false but R is true.	[1]
20	**Assertion (A):** Derivative of $(4x-3)^5$ is $20(4x-3)^4$ **Reason (R):** $\frac{d}{dx}x^n=nx^{n-1}$ A) Both A and R are true and R is the correct explanation of A. B) Both A and R are true but R is not the correct explanation of A. C) A is true but R is false. D) A is false but R is true.	[1]
	Section B	
21	Two finite sets have m and k elements respectively. If the ratio of numbers of subsets of A to the number of subsets of set B is 64: 1 and the sum of the number of elements of A and B is 12, then find the values of m and k. **OR** Let U = {1, 2, 3, 4, ...7} A= {2, 4, 6} B = {3, 5} C = {1, 2, 4, 7} Verify the following i) $A-(B\cup C)=(A-B)\cap(A-C)$ ii) $A\cap(A\cup B)'=\emptyset$	[2]

22	Draw the graph of the greatest integer function $f : R \to R: f(x) = [x]$ for all $x \epsilon R$.	[2]
23	Solve and find the graphical solution of inequality $\frac{3x-4}{2} \geq \frac{x+3}{4} - 1, x \epsilon R$	[2]
24	If A is the A.M between a and b, show that $\frac{A+2a}{A-b} + \frac{A+2b}{A-a} = 4$ **OR** If a, b, c, d are in GP, prove that $(a^2 + b^2 + c^2)(b^2 + c^2 + d^2) = (ab + bc + cd)^2$	[2]
25	Evaluate $\lim_{x \to \frac{\pi}{4}} \frac{\sin x - \cos x}{x - \frac{\pi}{4}}$	[2]
	Section C	
26	Let $U = \{x : x \epsilon N \text{ and } x \leq 8\}$, $A = \{x : 5 < x^2 < 50\}$ and $B = \{x: x \text{ is prime number less than } 8\}$. Draw a Venn diagram to show the relationship between the given sets. Hence, list the elements of the following sets: (i) A' (ii) B' (iii) $A - B$. Is $A - B = A \cap B'$?	[3]
27	Prove that $\cos^2 x + \cos^2\left(x + \frac{\pi}{3}\right) + \cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$ **OR** Show that $\sin \alpha + \sin\left(\alpha + \frac{2\pi}{3}\right) + \sin\left(\alpha + \frac{4\pi}{3}\right) = 0$	[3]
28	Determine the point in yz-plane which is equidistance from three points A (2, 0, 3), B(0, 3, 2) and C(0,0,1). **OR** What are the coordinates of the vertices of a cube whose edge is 2 units, one of whose vertices coincides with the origin and the three edges passing through the origin, coincides with the positive direction of the axes through the origin?	[3]
29	A manufacturer has 470 litres of a 9% acid solution. How many litres of a 3% acid solution must be added to it so that acid content in the resulting mixture be more than 5% but less than 7%?	[3]
30	Verify whether $\lim_{x \to 0} f(x)$ exists for the given function $f(x) = \begin{cases} \frac{x}{\lvert x \rvert + 2x^2}, & x \neq 0 \\ k, & x = 0 \end{cases}$ **OR** i) Evaluate $\lim_{x \to 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x}$ **(2M)** ii) Evaluate $\lim_{x \to 0} \frac{e^x + \sin x - 1}{x}$ **(1M)**	[3]

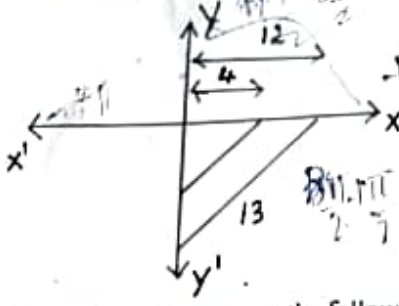
31	If $y = (x-a)(x-b)$ then find the value of x when $\frac{dy}{dx} = 0$	(3M)	[3]

Section D

32	(i) Find the domain of the function f defined by $f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$	(3M)	[5]
	(ii) Find the domain and range of $f(x) = 1 - \lvert x-2 \rvert$	(2M)	
33	If $\cos x = -\frac{1}{3}$ and x lies in quadrant III, find the values of $\sin\frac{x}{2}$, $\cos\frac{x}{2}$, $\tan\frac{x}{2}$ and $\frac{\cos^2\frac{x}{2} - \tan^2\frac{x}{2}}{\operatorname{cosec}\frac{x}{2}}$.		[5]
	OR		
	If $\tan\beta = \frac{n\sin\alpha\cos\alpha}{1-n\sin^2\alpha}$, show that $\tan(\alpha-\beta) = (1-n)\tan\alpha$		[5]
34	i) Find the value of n, so that $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ may be the geometric mean between a and b.		[3]
	ii) Which term of the sequence $2, 2\sqrt{2}, 4, \ldots\ldots$ is 8?		[2]
35	Find derivatives of $f(x)$ from the first principle, where $f(x)$ is $\sin x + \cos x$		[5]
	OR		
	i) Differentiate $\frac{5x^3-4x^2+3}{\sqrt{x}}$, with respect to x		[3]
	ii) If $y = \frac{x^2\cos\left(\frac{\pi}{4}\right)}{\sin x}$, differentiate with respect to x		[2]

SECTION E

36 Rajiv constructs two right angled triangles in the fourth quadrant in such a way that triangle gives $\cos A = \frac{4}{5}$ and $\cos B = \frac{12}{13}$, where $\frac{3\pi}{2} < A$ and $B > 2\pi$.



Based on the above information, answer the following questions.

(i)	Find the value of $\cos(A+B)$	[1]
(ii)	Determine the value of $\sin(A-B)$	[1]
(iii)	Evaluate $\tan(A+B)$	[2]
	OR	
	Find the value of $\cot(A-B)$	

37	During covid-19, a pharmaceutical company decides to make anti-viral pills at the rate of 1.5 times the pills made every last week. Answer the following questions: (i) If they have prepared, 6750 pills in fourth week, then how many pills they have made in first week? (ii) How many pills will be prepared in nth week? (iii) In which week they might have prepared 10125 pills? **OR** (iii) How many total pills will they prepare in 20 weeks?	[1] [1] [2]
38	A triangular board is supported at its centroid which is at the origin. If the three vertices of triangle are $A(2a, 2, 6), B(-4, 3b, -10), C(8, 14, 2c)$, then i) Find the value of a, b and c. ii) Find the length of the median through vertex A	[2] [2]