Time Allowed: 3 Hrs.   Maximum Marks : 80
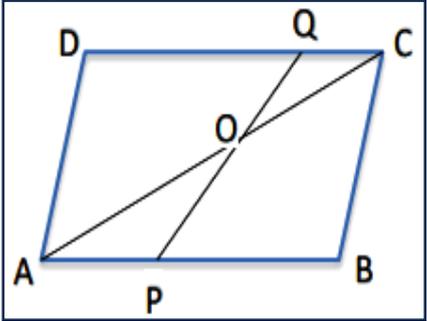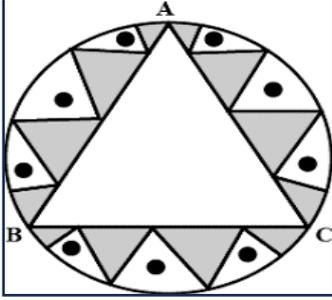
General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

	SECTION -A
	Section A consists of 20 questions of 1 mark each.
1.	If sum of two numbers is 1215 and their HCF is 81, then the possible number of pairs of such numbers are A) 2 B) 3 C) 5 D)4
2.	One equation of a pair of dependent linear equations is $-5x + 7y = 2$. The second equation can be (A) $10x + 14y + 4 = 0$ (B) $-10x - 14y + 4 = 0$ (C) $-10x + 14y + 4 = 0$ (D) $10x - 14y = -4$
3.	If one zero of the quadratic polynomial $f(x) = 4x^2 - 8kx + 8x - 9$ is negative of the other, then sum of zeroes of $kx^2 + 3kx + 2$. (a) 1 (b) 3 (c) -3 (d)5
4.	If the sum of first n odd natural numbers is equal to k times the sum of first n even natural numbers, then k is equal to $(a) \dfrac{(n+1)}{n}$ (b) $\dfrac{(n+1)}{2n}$ (c) $\dfrac{n}{n+1}$ (d) $\dfrac{2n}{n+1}$
5.	Consider the data: <table><tr><td>*Marks*</td><td>Below 10</td><td>Below 20</td><td>Below30</td><td>Below 40</td><td>Below 50</td><td>Below 60</td></tr><tr><td>No.of Students</td><td>3</td><td>12</td><td>27</td><td>57</td><td>75</td><td>80</td></tr></table> The modal class is: (a) 10-20 (b) 20-30 (c) 30-40 (d) 50-60
6.	ABCD is a trapezium with AD ∥ BC and AD = 4cm. If the diagonals AC and BD intersect each other at O such that $\dfrac{AO}{OC} = \dfrac{DO}{OB} = \dfrac{1}{2}$, then BC (a) 4cm (b) 6 cm (c) 8 cm (d) 9 cm

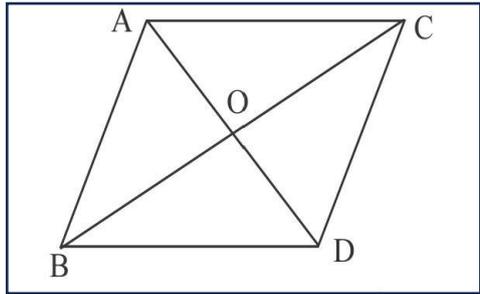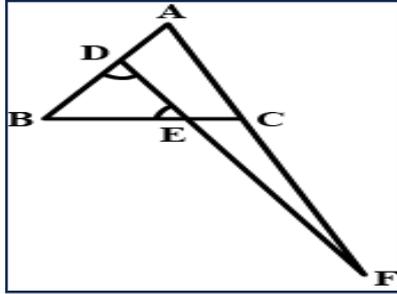|	
7.	The roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal, then (a) $2a = b + c$ (b) $2c = a + b$ (c) $b = a + c$ (d) $2b = a + c$
8.	If $4\tan\Theta - 3 = 0$, Find the value of : $\frac{4\sin\theta - 3\cos\theta}{4\sin\theta + 3\cos\theta}$. (a) 0 (b) 1/3 (c) 2/3 (d) 3/4
9.	If PA, QB and RC are each perpendicular to AC.If x = 8 cm and z = 6 cm,then y is equal to (a) 56/7 (b) 7/56 (c) 25/7 (d) 24/7.
10.	If $\tan\alpha + \cot\alpha = 2$, then value of $\sin^3\alpha + \cos^3\alpha$ (a) $\frac{1}{2}$ (b) 1 (c) $\sqrt{2}$ (d) $\frac{\sqrt{2}}{2}$
11.	The distance between two points A and B, on a graph is given as $\sqrt{10^2 + 7^2}$. The coordinates of A are $(-4,3)$. Given that the point B lies in the first quadrant, then all the possible x-coordinates of point B are (a) multiple of 2 (b) multiple of 3 (c) multiple of 5 (d) multiple of 6
12.	If two tangents inclined at an angle 60° are drawn to a circle of radius 3 cm, then length of each tangent is equal to (A) 6 cm (B) 3 cm (C) $3\sqrt{3}$ cm (D) $1.5\sqrt{3}$ cm
13.	A point (x,y) is at a distance of 5 units from the origin. How many such points lie in the third quadrant? (a) 0 (b) 1 (c) 2 (d) infinitely many
14.	If the perimeter of a circle is equal to half of a square, then the ratio of their areas is (A) 22 : 7 (B) 7 : 11 (C) 7 : 22 (D) 11: 7
15.	There is a green square board of side '2a' unit circumscribing a red circle. Jayadev is asked to keep a dot on the abovesaid board. Find the probability that he keeps the dot on the green region. (a) π/4 (b) 4−π/4 (c) π−4/4 (d) 4/π
16.	The minute hand of a clock is 84 cm long. The distance covered by the tip of minute hand from 10:10 am to 10:25 am is (a) 44 cm (b) 88 cm (c) 132 cm (d) 176 cm
17.	Two dice are rolled simultaneously. What is the probability that 5 will come up at least once? (a)1/6 (b) 7/36 (c) 11/36 (d) 5/13
18.	If a pole 6 m high casts a shadow 2 √3m long on the ground, then the Sun's elevation is (a) 60° (b) 45° (c) 30° (d) 90°

19.	DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option
	      Assertion(A): Maximum value of $\frac{1}{(\sec\theta)} + \frac{1}{(\csc\theta)}$ is 1
	      Reason(R): Maximum value of both $\sin\theta$ and $\cos\theta$ is 1 .
	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
	(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
	(c) Assertion (A) is true but reason (R) is false.
	(d) Assertion (A) is false but reason (R) is true.

20.	Statement A (Assertion): Total Surface area of the top is the sum of the curved surface area of the hemisphere and the curved surface area of the cone. Statement R(Reason) : Top is obtained by joining the plane surfaces of the hemisphere and cone together.
	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A) (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.

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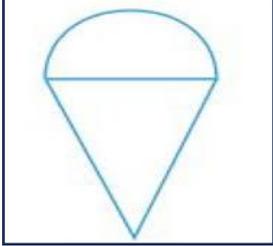
SECTION B

Section B consists of 5 questions of 2 marks each.

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21.	A forester wants to plant 66 apple trees, 88 banana trees and 110 mango trees in equal rows (in terms of number of trees). Also, he wants to make distinct roots of the trees (only one type of tree in one row). Find the minimum number of rows required.
22.	If α & β are the zeroes of the polynomial $3x^2 + kx + 3$ & $α^2 + β^2 + αβ = \frac{21}{4}$, then find the value of k . Hence find polynomial whose zeroes are reciprocal of zeroes of given polynomial. OR If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of the polynomial $2x^2 - 5x - 3$, then find the values of p and q. Hence find polynomial whose zeroes are reciprocal of zeroes of given polynomial .
23.	ABCD is a parallelogram. Point P divides AB in the ratio 2:3 and point Q divides DC in the ratio 4:1. Prove that OC is half of OA . OR If AD and PM are medians of triangles ABC and PQR, respectively where Δ ABC ~ Δ PQR, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.
24.	i) If cos (A + 2B) = 0, 0° ≤ (A + 2B) ≤ 90° and cos (B - A) = $\frac{\sqrt{3}}{2}$, 0° ≤ (B - A) ≤ 90°, then find cosec (2A + B). ii) If sin x + $cosec\ x$ = 2, then find the value of $sin^{19} x$ + $cosec^{20}$x .
25.	PA and PB are tangents drawn to a circle of centre O from an external point P. Chord AB makes an angle of 30° with the radius at the point of contact. If length of the chord is 6 cm, find the length of the tangent PA and the length of the radius OA.

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SECTION C

Section C consists of 6 questions of 3 marks each.

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26.	Given that √3 is irrational, prove that 5 + 2√3 is irrational.
27.	In a circular table cover of radius 32 cm, a design is formed leaving an equilateral triangle ABC in the middle as shown in Fig. Find the area of the design. OR

A chord of a circle of radius 12 cm subtends an angle 120^0 at the centre . Find the length of corresponding arc & area of the corresponding segment of the circle .
[Use pi = 3.14 & √3 = 1.73]

28.	The area of a rectangle reduces by 160 m² if its length is increased by 5 m and breadth is reduced by 4 m. However, if length is decreased by 10 m and breadth is increased by 2 m, then its area is decreased by 100 m². Find the dimensions of the rectangle.

<div align="center">OR</div>

A shopkeeper sells a saree at 8% profit and a sweater at 10% discount, thereby, getting a sum Rs 1008. If she had sold the saree at 10% profit and the sweater at 8% discount, she would have got Rs 1028. Find the cost price of the saree and the list price (price before discount) of the sweater.

29.	Prove that : $\left(\dfrac{1}{sec^2\theta-cos^2\theta} + \dfrac{1}{cosec^2\theta-sin^2\theta}\right) sin^2\theta \, cos^2\theta = \dfrac{1-sin^2\theta\,cos^2\theta}{2+sin^2\theta\,cos^2\theta}$. OR

<div align="center">Prove that : $\dfrac{(\sin\theta - \cos\theta + 1)}{(\sin\theta + \cos\theta -1)} = \dfrac{1}{(\sec\theta - \tan\theta)}$.</div>

30.	In a right triangle ABC in which ∠B = 90°, a circle is drawn with AB as diameter intersecting the hypotenuse AC and P. Prove that the tangent to the circle at P bisects BC.

<div align="center">OR</div>

i)   Prove that the intercept of a tangent between two parallel tangents to a circle subtends a right angle at the centre.

ii)   From a point P, two tangents PA and PB are drawn to a circle C(0, r). If OP = 2r, then find $\angle APB$. What type of triangle is APB?
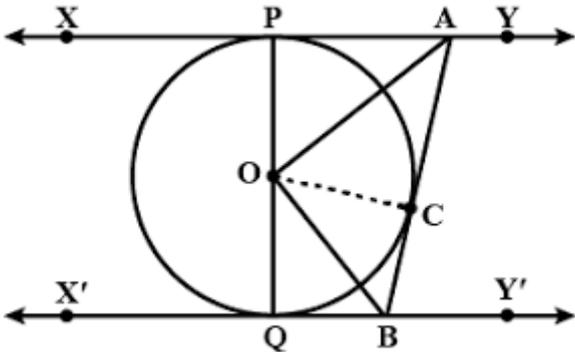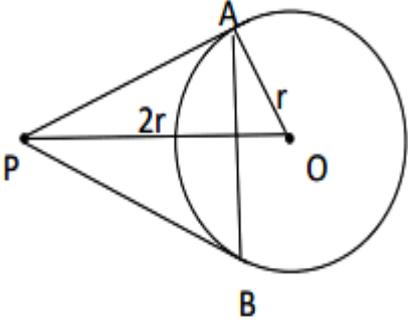
31.	a) 2 Black Kings & 2 red Jacks are removed from pack of 52 cards. One card is drawn from rest of cards, what is Probability that drawn card is :

i)   Either face card or Heart
ii)   Either king or Spade

b) What is probability that a leap year contains 53 Sundays ?

<div align="center">**SECTION D**
Section D consists of 4 questions of 5 marks each.</div>

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32.	Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. OR In a flight of 600km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr from its usual speed and the time of the flight increased by 30 min. Find the scheduled duration of the flight.
33.	ΔABC & ΔDBC are two triangles on the same base BC . If AD intersects BC at O , Show that $\frac{ar\ (\Delta ABC)}{ar\ (\Delta DBC)} = \frac{AO}{DO}$. OR In figure, ∠BED = ∠BDE & E divides BC in the ratio 2 : 1. Prove that AF × BE = 2 AD × CF.
34.	A tent is in the shape of a cylinder surmounted by a conical top. If the height and radius of the cylindrical part are 3 m and 14 m respectively, and the total height of the tent is 13.5 m, find the area of the canvas required for making the tent, keeping a provision of 26 m² of canvas for stitching and wastage. Also, find the cost of the canvas to be purchased at the rate of ₹ 500 per m². OR Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively decided to provide place and the canvas for 1500 tents and share the whole expenditure equally. The lower part of each tent is cylindrical with base radius 2.8 m and height 3.5 m and the upper part is conical with the same base radius, but of height 2.1 m. If the canvas used to make the tents costs ₹120 per m², find the amount shared by each school to set up the tents.
35.	Mean of following frequency distribution table is 65.6, Find Missing frequencies . <table><tr><td>Class</td><td>10-30</td><td>30-50</td><td>50-70</td><td>70- 90</td><td>90-110</td><td>110-130</td><td>Total</td></tr><tr><td>Frequency</td><td>5</td><td>8</td><td>X</td><td>20</td><td>y</td><td>2</td><td>50</td></tr></table> Hence find the Mean & Mode of data.
	SECTION E **Case study based questions are compulsory**.

36.	The angle of elevation of an airplane from a point on the ground is 60°. After a flight of 30 seconds, it is observed that the angle of elevation changes to 30°. The height of the plane remains constantly as 3000√3 m. Use the above information to answer the questions that follow-
	    (i) Draw a neat labelled figure to show the above situation diagrammatically.
	    (ii) What is the distance travelled by the plane in 30 seconds? OR Keeping the height constant, during the above flight, it was observed that after 15(√3 -1) seconds, the angle of elevation changed to 45°. How much is the distance travelled in that duration.
	    (iii) What is the speed of the plane in km/hr.

37.	A craftsman thought of making a floor pattern after being inspired by the above design. To ensure accuracy in his work, he made the pattern on the Cartesian plane. He used regular octagons, squares and triangles for his floor tessellation pattern
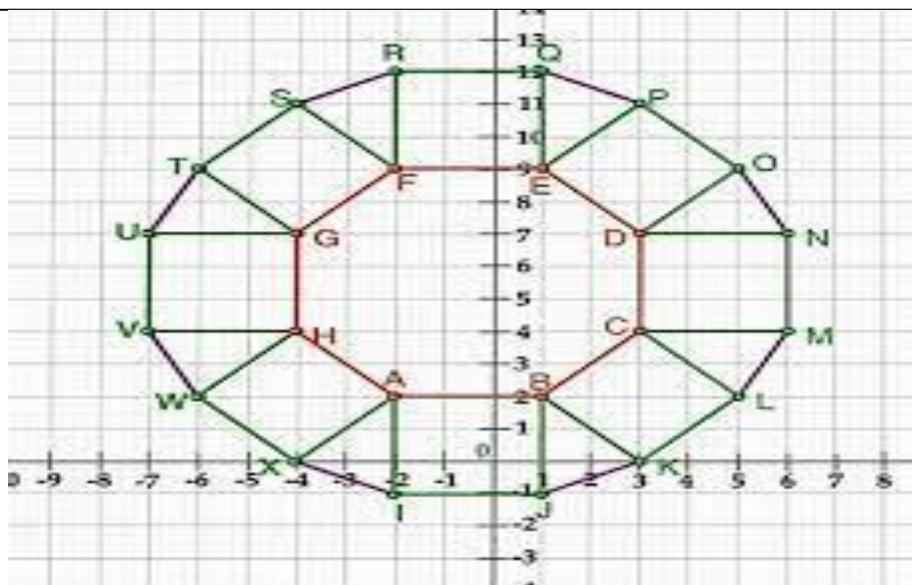
Use the above figure to answer the questions that follow:
- (i)   What is the length of the line segment joining points B and F?
- (ii)   The centre 'Z'of the figure will be the point of intersection of the diagonals of quadrilateral WXOP. Then what are the coordinates of Z?
- (iii)   What are the coordinates of the point on y axis equidistant from A and G? OR What is the area of Trapezium AFGH?

38. Your friend Veer wants to participate in a 200 m race. He can currently run that distance in 51 seconds and with each day of practice it takes him 2 seconds less. He wants to do in 31 seconds.

- i)   What is minimum number of days he need to practice till his goal is achieved.
- ii)   If nth term of AP is given by $a_n = 2n + 3$, find the S_n .
- iii)   In an AP, if Sn = $3n^2 + 5n$ and a_k = 164, find the value of k.   OR
          How many numbers lie between 10 and 300, which when divided by 4 leave a remainder 3?