

June - 2017

Time Allowed: 2½ Hours

Maximum Marks:100

Note: This question paper contains four sections.

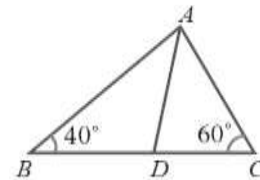
SECTION - I (MARKS: 15)

Note: (i) Answer all the 15 questions.

15x1=15

(ii) Choose the correct answer from the given four alternatives and write the option code and corresponding answer.

- If $f = \{(6,3), (8,9), (5,3), (-1,6)\}$, then the pre-images of 3 are
A) 5 and -1 B) 6 and 8 C) 8 and -1 D) 6 and 5
- If a_1, a_2, a_3, \dots are in A.P. such that $\frac{a_4}{a_7} = \frac{3}{2}$ then the 13th term of the A.P. is
A) $\frac{3}{2}$ B) 0 C) $12a_1$ D) $14a_1$
- If the product of the first four consecutive terms of a G.P. is 256 and if the common ratio is 4 and the first term is positive, then its 3rd term is
A) 8 B) $\frac{1}{16}$ C) $\frac{1}{32}$ D) 16
- The remainder when $x^2 - 2x + 7$ is divided by $x + 4$ is
A) 28 B) 29 C) 30 D) 31
- Let $b = a + c$. Then the equation $ax^2 + bx + c = 0$ has equal roots, if
A) $a = c$ B) $a = -c$ C) $a = 2c$ D) $a = -2c$
- $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$, then the values of a, b, c and d respectively are
A) -1, 0, 0, -1 B) 1, 0, 0, 1 C) -1, 0, 1, 0 D) 1, 0, 0, 0
- Slope of the straight line which is perpendicular to the straight line joining the points $(-2, 6)$ and $(4, 8)$ is equal to
A) $\frac{1}{3}$ B) 3 C) -3 D) $-\frac{1}{3}$
- If a straight line $y = 2x + k$ passes through the point $(1, 2)$, then the value of k is equal to
A) 0 B) 4 C) 5 D) -3
- In figure, if $\frac{AB}{AC} = \frac{BD}{DC}$, $\angle B = 40^\circ$, and $\angle C = 60^\circ$, then $\angle BAD =$
A) 30° B) 50°
C) 80° D) 40°



- The areas of two similar triangles are 16cm^2 and 36cm^2 respectively. If the altitude of the first triangle is 3 cm, then the corresponding altitude of the other triangle is
A) 6.5 cm B) 6 cm C) 4 cm D) 4.5 cm
- If $x = a \sec \theta$, $y = b \tan \theta$ then the value of $\frac{x^2}{a^2} - \frac{y^2}{b^2} =$
A) 1 B) -1 C) $\tan^2 \theta$ D) $\operatorname{cosec}^2 \theta$
- $(\cos^2 \theta - 1)(\cot^2 \theta + 1) + 1 =$
A) 1 B) -1 C) 2 D) 0

13. If the surface area of a sphere is 100π cm², then its radius is equal to
 A) 25 cm B) 100cm C) 5 cm D) 10 cm
14. Variance of the first 11 natural numbers is
 A) $\sqrt{5}$ B) $\sqrt{10}$ C) $5\sqrt{2}$ D) 10
15. The probability that a non-leap year will have 53 Sundays and 53 Mondays is
 A) $\frac{1}{7}$ B) $\frac{2}{7}$ C) $\frac{3}{7}$ D) 0

SECTION - II (MARKS: 20)**Note: (i) Answer 10 questions.****10x2=20****(ii) Question number 30 is compulsory. Select any 9 questions from the first 14 questions.**

16. Let $P = \{a, b, c\}$, $Q = \{g, h, x, y\}$ and $R = \{a, e, f, s\}$. Find $R \setminus (P \cap Q)$
17. Check if the relation $f = \{(1,2), (4,5), (9, -4), (16,5)\}$ is function from $A = \{1, 4, 9, 16\}$ to $B = \{-1, 2, -3, -4, 5, 6\}$. In case of a function, write down its range
18. If 2 and -3 are the roots of a quadratic polynomial equation, find the corresponding polynomial in General form.
19. Find the square root of $(2x + 3y)^2 - 24xy$
20. Let $A = \begin{pmatrix} 3 & 2 \\ 5 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 8 & -1 \\ 4 & 3 \end{pmatrix}$. Find the matrix C if $C = 2A+B$.
21. Determine whether the product of the matrix is defined in AB , where $A = [a_{ij}]_{4 \times 3}$, $B = [b_{ij}]_{3 \times 2}$. If so, state the order of the product.
22. If $P(x, y)$ is any point on the line segment joining the points $(a, 0)$ and $(0, b)$ then prove that $\frac{x}{a} + \frac{y}{b} = 1$, where $a, b \neq 0$
23. Find the equation of the straight line passing through the points $(-2, 5)$ and $(3, 6)$
24. AB and CD are two chords of a circle which intersect each other externally at P if $AB = 4$ cm, $BP = 5$ cm and $PD = 3$ cm, then find CD
25. For what values of θ , $\sin \theta + \cos \theta > 2$. If not, justify your answer.
26. A kite is flying with a string of length 200 m. If the thread makes an angle 30° with the ground, find the distance of the kite from the ground level. (Here, assume that the string is along a straight line)
27. The thickness of a hemispherical bowl is 0.25 cm. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl (Take $\pi = \frac{22}{7}$)
28. Find the range and co-efficient of the range of the following data 59, 46, 30, 23, 27, 40, 52, 35, 29.
29. If A is an event of a random experiment such that $P(A):P(\bar{A}) = 7:12$, then find $P(A)$
30. (a) In a geometric series $2 + 4 + 8 + \dots$ starting from the first term how many consecutive terms are needed to yield the sum 1022? (Or)
- (b) Find the total surface area of a hollow hemisphere whose outer and inner radii are 4.2 cm and 2.1 cm respectively.

SECTION - III (MARKS: 45)**Note: (i) Answer 9 questions.****9 x 5 = 45****(ii) Question number 45 is compulsory. Select any 8 questions from the first 14 questions.**

31. Use Venn diagrams to verify the De-Morgan's Law of set difference $A \setminus (B \cup C) = (A \setminus B) \cap (A \setminus C)$
32. Let $A = \{6, 9, 15, 18, 21\}$ and $B = \{1, 2, 4, 5, 6\}$ and $f: A \rightarrow B$ be defined by $f(x) = \frac{x-3}{3}$ Represent f by (i) an arrow diagram (ii) a set of ordered pairs (iii) a table (iv) a graph.

33. The sum of first three terms of a geometric sequence is $\frac{13}{12}$ and their product is -1 . Find the common ratio and the terms.
34. The measures of the interior angles taken in order of a polygon form an arithmetic sequence. The least measurement in the sequence is 85° . The greatest measurement is 215° . Find the number of sides in the given polygon.
35. A fraction is such that if the numerator is multiplied by 3 and the denominator is reduce by 3, we get $\frac{18}{11}$, but if the numerator is increased by 8 and the denominator is doubled, we get $\frac{2}{5}$. Find the fraction.
36. Find the values of a and b if the polynomial are perfect square $4x^4 - 12x^3 + 37x^2 + ax + b$
37. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$ then show that $A^2 - 4A + 5I_2 = O$
38. If C is the midpoint of the line segment joining $A(4,0), B(0,6)$ and if O is the origin, then show that C is equidistant from all the vertices of ΔOAB
39. In ΔPQR , given S is a point on PQ such that $ST \parallel QR$ and $\frac{PS}{SQ} = \frac{5}{3}$. If $PR = 6.4$ cm, then find PT
40. A flag post stands on the top of a building. From a point on the ground, the angles of elevation of the top and bottom of the flag post are 60° and 45° respectively. If the height of the flag post is 10m, find the height of the building. ($\sqrt{3} = 1.732$)
41. A cricket stump is in the shape of a cylinder surmounted by a cone. The diameter and the total height of the stump are 10cm and 80 cm respectively. If the height of the conical part is 12 cm, then find its total surface area.
42. A vessel is in the form of a frustum of a cone. Its radius at one end and the height are 8cm and 14 cm respectively. If its volume is $\frac{5676}{3}$ cm³, then find the radius at the other end.
43. Calculate the co-efficient of variation of the following data 20, 18, 32, 24, 26
44. A card is drawn from a deck of 52 cards. Find the probability of getting a King or a Heart or a Red card.
45. (a) If α and β are the roots of the equation $2x^2 - 3x - 1 = 0$, find the values of
 (i) $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ (ii) $\left(\alpha + \frac{1}{\beta}\right)\left(\frac{1}{\alpha} + \beta\right)$ (Or)
- (b) If $A(3, 6)$ and $C(-1, 2)$ are two vertices of a rhombus $ABCD$, then find the equation of the straight line that lies along the diagonal BD

SECTION -IV (MARKS: 20)

Note: Answer both the questions choosing either of the alternatives.

2 x 10 = 20

46. (a) Draw a circle of radius 3 cm. From an external point 7 cm away from its centre, construct the pair of tangents to the circle and measure their lengths. (Or)
- (b) Construct a ΔABC such that $BC = 5$ cm, $\angle A = 45^\circ$ and the median from A to BC is 4 cm
47. (a) Draw the graph of $y = x^2$ and hence solve $x^2 - 4x - 5 = 0$ (Or)
- (b) A bus travels at a speed of 40 km/hr. Write the distance-time formula and draw the graph of it. Hence, find the distance travelled in 3 hours.