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10 C 23

CARMEL CONVENT SCHOOL, CHANDIGARH

FIRST TERMINAL

SUBJECT: MATHEMATICS

Class: X **Total Marks: 80**

Date: 08.09.2023 **Time: 3 Hrs**

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 01 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 sub-parts of the values of 1, 1 and 2 marks each respectively.
7. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

Q1 The number 385 can be expressed as the product of prime factors as

a) 5 x 11x13 b) 5x7x11

c) 5x7x13 d) 5x11x17

Q2 The zeros of the polynomial $3x^2 + 11x - 4$ are

a) ½ , -4 b) ¼ , -3

c) ⅓ , -4 d) ⅓ , 4

Q3 Graphically , the pair of equations

$-6x - 2y = 21$; $2x - 3y + 7 = 0$

represents two lines, which are

a) Intersecting at one point, exactly

b) intersecting exactly at 2 points

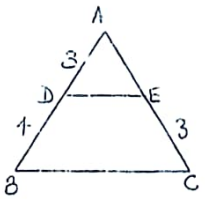
c) coincident d) parallel

Q4 For which value of k the following pair of linear equations will have no solution

$3x + ky = 7$; $kx + 3y = 15$

a) ± 9 b) ± 5 c) ± 4 d) ± 3

Q5 In the given figure DE is parallel to BC and all measurements are given in cm . (AD=3cm; BD=4cm; EC= 3cm)



The length of AE is :

a) 2cm b) 2.25cm c) 2.5cm d) 2.75cm

Q6 A vertical pole of 19 m casts a shadow 57 m long on the ground and at the same time a tower casts a shadow 51 m long. The height of the tower is

a) 171m b) 13m c) 17m d) 117m

Q7 $2\cos^2\theta\,(1 + \tan^2\theta)$ is equal to :

a) 0 b) 1 c) 2 d) 3

Q8 Given $\sin A = \frac{1}{2}$ $\cos B = 1/\sqrt{2}$; then the value of A + B is

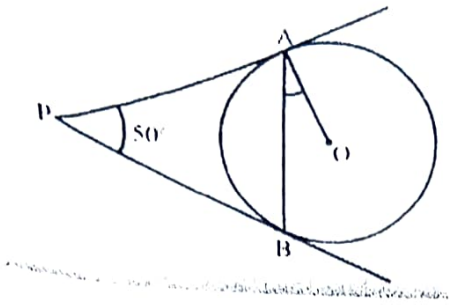
a) 30° b) 45° c) 75° d) 15°

Q9 If the length of the shadow of a tree increases, then the angle of sun's elevation

a) increases b) decreases

c) remains the same d) can't say

Q10 In the figure, PA and PB or two tangent to the circle with Centre O such that



$\angle APB = 50°$. Then the measure of $\angle OAB$ is

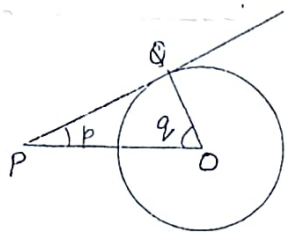
a) 25° b) 50° c) 75° d) 100°

Q11 Number of tangent(s) a circle can have

a) no tangent b) one

c) two d) infinitely many

Q12 In the given figure, PQ is a tangent to the circle with Centre O. If $\angle OPQ$ is equal to p , $\angle POQ$ is equal to q , then p + q is



a) 45° b) 90° c) 60° d) 180°

Q13 From a pack of 52 playing cards, a card is drawn at random. The probability that the drawn card is not a face card is

a) 3/13 b) 9/13 c) 10/ 13 d) 3 / 4

Q14 If alpha and beta are zeros of polynomial P(x) , then P(x) =

a) $(x - \alpha)(x - \beta)$ b) $(x - \alpha)(x + \beta)$

c) $(x + \alpha)(x - \beta)$ d) $(x + \alpha)(x + \beta)$

Q15 Using empirical relationship, the mode of distribution whose mean is 7.2 and median 7.1, is

a) 6.2 b) 6.3 c) 6.5 d) 6.9

Q16 For the following distribution :

Class	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	24	9

The modal class is

a) 10-15 b) 20-25 c) 5-10 d) 0-5

Q17 The data has 25 observations arranged in the descending order. Which observation represents the median

a) 12th b) 13th c) 14th d) 15th

Q18 If the probability of an event is P, probability of its complimentary event will be

a) P -1 b) P c) 1- P d) 1 - 1/P

In Q19 and Q20 , a statement of assertion(A) is followed by a statement of reason(R) . Choose the correct option :

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

Q19 Assertion : (A) If the ratio of the height of a tower to the length of its shadow on the ground, is root three ratio 1 , then the angle of the elevation of the sun is 60°.

Reason: ®. If the observer moves towards the object, like a building, then the angle of elevation decreases.

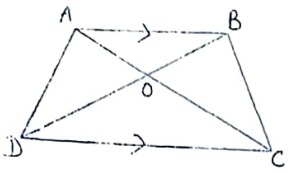
Q20 Assertion : (A) Two players, Sandhya and Ashim plays a tennis match. The probability of Sandhya winning the match is 0.79 and the probability of Ashim winning the match is 0.21.

Reason: ® The sum of probabilities of two complementary events is 1.

SECTION B

Q21 Two straight paths are represented by equations. X - 3Y = 2 and - 2X + 6Y = 5. Check algebraically, whether the paths cross each other or not.

Q22 In the given figure, AO / OC = BO / OD = ½ . Find the length of CD.



Q23 Evaluate

$2(\cos^4 60° + \sin^4 30°) + (\tan^2 60° + \cot^2 30°) + \sec^2 30°$

Q24 Find the median class of the following distribution

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	4	4	8	10	12	8	4

Q25 An observer , 1.7 m tall, is $20\sqrt{3}$ m away from a tower. The angle of elevation from the eye of the observer to the top of the tower is 30°. Find the height of the tower.

SECTION C

Q26 Prove that root √2 is an irrational number.

Q27 Sum of the areas of two squares is 468 m². If the difference of the perimeter is 24 m, find the lengths of the sides with two squares.

Q28 In Δ OPQ, right angled at P, OP = 7 cm and OQ - PQ = 1 , determine the values of sin Q and cos Q.

Q29 Prove that

$$\frac{\cos^2\theta}{1-\tan\theta} + \frac{\sin^2\theta}{\sin\theta - \cos\theta} = 1 + \sin\theta\cos\theta$$

Q30 Prove that the lengths of tangents drawn from an external point to a circle are equal in length.

Q31 Compute the mode of the following distribution:

Size of items(cm)	0-4	4-8	8-12	12-16	16-20	20- 24	24-28
Frequency	5	7	9	17	12	10	6

SECTION D

Q32 Form the pair of equations in the following problem and find a solution graphically.

10 students of class X took part in the mathematics quiz . If the number of girls is four more than the number of boys. Find the number of boys and girls who took part in the quiz.

Q33 State and prove Thales Theorem . Hence prove the following.

If a line intersects sides, AB and AC of Δ ABC at ,D and E respectively, and is parallel to BC, prove that AD / AB = AE / AC

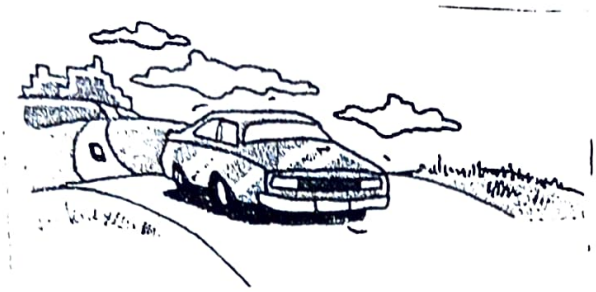
Q34 From the top of a tower, 100 metre high, a man observes two cars on the opposite sides of the tower, and in the same straight line, with its base, with angles of depression, 30° and 45°. Find the distance between the cars. (Take $\sqrt{3}$ = 1.732)

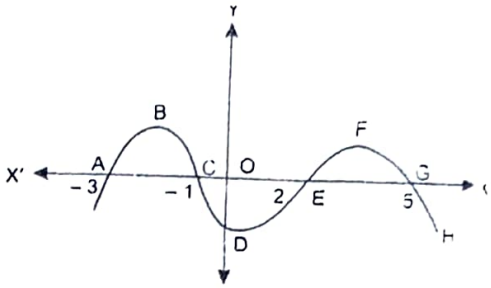
Q35 The distribution below shows the number of wickets taken by bowlers in one-day cricket matches. Find the mean and median of the number of wickets taken.

Number of wickets	20-60	60-100	100-140	140-180	180-220	220-260
Number of bowlers	7	5	16	12	2	3

SECTION E

Q36 A car moves on a highway. The path it traces has been given below.





Based on the above information, answer the following questions

I) What is the shape of the curve EFG? (1)

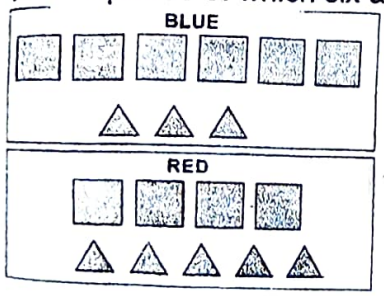
II) Write the number of zeros of the polynomial representing the whole curve (1)

III) If the curve ABC is represented by the polynomial, $X^2 + 4X + 3$, then find its zeros. (2)

Or

If the path traced by the car has zeros at -1 and 2 then write the quadratic polynomial for the same . (2)

Q37 A child's game has eight triangles of which three are blue and the rest are red , 10 squares of which six are blue and the rest are red. One piece is lost at random.



Based on the above information, answer the following questions

I) What is the probability that it is a triangle? (1)

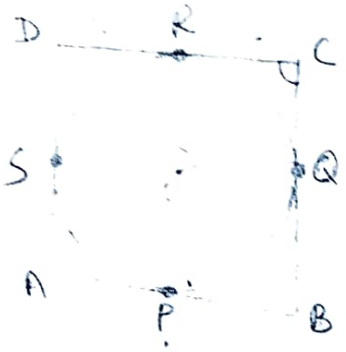
II) Find the probability that it's a square . (1)

III) Find the probability that it is a square of blue colour. (2)

Or

Find the probability that it is a red colour piece. (2)

Q38 In a park, four poles are standing at positions A, B, C and D around the fountain such that the cloth joining the poles AB, BC, CD and DA touches the fountain at P, Q, R and S respectively as shown in the figure.



Based on the above information, answer the following questions.

(I) If O is the centre of the circular fountain, then find ∠OSA (1)

(II) If DR = 7 cm and AD = 11 cm, then find AP . (1)

(III) If O is the centre of the fountain, with ∠QCR = 60°, then find ∠QOR (2)

Or

Prove that AB + CD = BC + DA (2)

- The End -