B-3-B

Total No. of Questions : **40+20+20]** [Total No. of Printed Pages : **24**

$X^{th}BAJKLK22$

8003-B

MATHEMATICS

(New/Old/Old II Course)

Time : 3 Hours] [Maximum Marks : **80**

NOTE :— The questions in the question paper are based on revised/pre-revised and old course syllabus marked as **"New Course"**, **"Old Course"** and **"Old II Course"** respectively and candidates are advised to appear in the relevant course meant for them. Candidates who may attempt the questions partly from **"New Course"**, partly from **"Old Course"** and partly from **"Old II Course"** will not be awarded. Candidates are also advised to record **"New Course"** or **"Old Course"** or **"Old II Course"** as the case may be, on the front page of the answer-book.

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(New Course)

Section–A

Note :— Q. Nos. **1** to **10** are MCQs of 1 mark each.

1. H.C.F. of 135 and 225 is :

   (A) 15

   (B) 9

   (C) 45.

   (D) None of these

2. Every constant is a polynomial of degree :

   (A) 1

   (B) 2

   (C) 0

   (D) None of these

3. If in a quadratic equation $ax^2 + bx + c = 0$ $(a \neq 0)$, $c = 0$, then roots of quadratic equation are :

   (A) One root is 0

   (B) Both roots are 0

   (C) None root is 0

   (D) None of these

4. If a, b, c are in A.P., then b is equal to :

   (A) $\dfrac{a-c}{2}$

   (B) $\dfrac{c-a}{2}$

   (C) $\dfrac{a+c}{2}$

   (D) None of these

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5. Any point which lesson x-axis has y-coordinate equal to :

(A) 1'

(B) 0

(C) –1

(D) None of these

6. A tangent can meet the circle at :

(A) 2 points

(B) 1 point

(C) Centre of circle

(D) None of these

7. The area of a circle whose circumference is 44 cm (using $\pi = \frac{22}{7}$) is :

(A) π cm^2

(B) $\frac{\pi}{2}$ cm^2

(C) 2π cm^2

(D) None of these

8. Sum of the probability of an event and its complement is always equal to : https://www.jkboseonline.com

(A) 0

(B) 1

(C) Not defined

(D) None of these

9. The value of $\dfrac{\sec 22°}{\csc 68°}$ is :

(A) –1

(B) 0

(C) 1

(D) None of these

10. The slent height of a Right circular cone of radius r cm and height h cm is equal to :

(A) $h^2 + r^2$

(B) $\sqrt{h^2 + r^2}$

(C) $h^2 - r^2$

(D) $\sqrt{h^2 - r^2}$

Note :— Q. Nos. **11** to **15** are fill in the blank with **1** mark each.

11. The common point a tangent to a circle and the circle is called

....

12. Consistent equations with unique solution meet at ....

(one point/no point)

13. In an A.P. series $S_n - S_{n-1}$ = ... (a_{n-1}/a_n)

Or

Find the 10th term of the series 4, 8, 12, ...

14. $\csc^2 \theta - \cot^2 \theta$ = ...   (0/1)

15. All circles are ....   (congruent/similar)

Note :— Q. Nos. **16** to **20** are short answer type questions carry 1 mark each.

16. Define Line of Sight.

17. Give *two* different examples of pair of similar figures.

18. State the converse of Basic Proportionality Theorem.

Or

State Pythagoras Theorem.

19. Define y-coordinate or ordinate.

20. If diameter of sphere = 2 unit, find the volume of sphere.

Section–B

Note :— Q. Nos. **21** to **26** carry 2 marks each.

21. A cubical block of side 7 cm is surmounted by a hemisphere. Find the surface area of the solid.

22. Find the H.C.F. of 96 and 404 by the prime factorisation method. Hence find their L.C.M.

23. Check wheather the pair of linear equations are consistent or inconsistent $\frac{3}{2}x + \frac{5}{3}y = 7$, $9x - 10y = 14$.

24. If $\sin A = \frac{3}{4}$, calculate cos A and tan A.

Or

Find the trigonometric ratios of 45°.

25. One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will :

    (i) be an ace

    (ii) not be an ace

26. The wickets taken by a bowler in 10 cricket matches are as follows :

$$2 \quad 6 \quad 4 \quad 5 \quad 0 \quad 2 \quad 1 \quad 3 \quad 2 \quad 3$$

   From the frequency distribution table of the given data, find mode of the data.

Section–C

Note :— Q. Nos. **27** to **34** carry 3 marks each.

27. Find the zeros of the quadratic polynomial and verify the relationship between the zeros and the coefficients

$$3x^2 - x - 4$$

Or

   Divide $3x^3 + x^2 + 2x + 5$ by $1 + 2x + x^2$ and verify the division algorithm.

28. Solve the following pair of linear equations by substitution method :

$$x + y = 14$$

$$x - y = 4$$

29. Find the roots of the quadratic equation, if they exist, using quadratic formulae

$$2x^2 - 2\sqrt{2}x + 1 = 0$$

30. Check whether 301 is a term of the list of numbers 5, 11, 17, 23, 29, ...

Or

Find the 11th term from the last term (towards the first term) of the A.P. series :

10, 7, 4, 1, ..., −62

31. Prove that :

$$\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2\sec A$$

32. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

Or

Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

33. Find the area of the sector of a circle with radius 4 cm and of angle 30°. Also find the area of corresponding major sector (using $\pi = 3.14$).

34. A metallic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm. Find the height of cylinder.

Section–D

Note :— Q. Nos. 35 to 40 carry 4 marks each.

35. Find the roots of the equation $\dfrac{1}{x+4} - \dfrac{1}{x-7} = \dfrac{11}{30}$, $x \neq -4$, $x \neq 7$.

Or

Sum of the areas of two squares is 468 m². If the difference of their perimeters is 24 m, find the sides of two squares.

. The angles of elevation of the top of a tower from two points of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary. Find the height of the tower.

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37. Find the relation between x and y such that the point (x, y) is equidistant from the points $(7, 1)$ and $(3, 5)$.

<center>*Or*</center>

Find the value of K, if the points A(2, 3), B(4, K) and C(6, −3) are collinear.

38. In an equilateral traingle, D is a point on the side BC. such that $BD = \frac{1}{3} BC$. Prove that :

$$9(AD)^2 = 7(AB)^2.$$

<center>*Or*</center>

Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

9. Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{5}{3}$ of the corresponding sides of the triangle ABC $\left(\text{i.e. of scale factor } \frac{5}{3} \right).$

The table below gives the percentage distribution of female teachers in the primary school of rural areas of various States and U.T. of India. Find mean percentage of female teachers using step deviation method :

Percentage of Female Teachers	No. of States/U.T.
15—25	6
25—35	11
35—45	7
45—55	4
55—65	4
65—75	2
75—85	1

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MATHEMATICS

(New/Old/Old II Course)

Time : 3 Hours]   **[Maximum Marks : 100**

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B-3-B

(Old Course)

1. Choose the correct answer :

(i) L.C.M. of 21 and 91 is :

   (A) 162

   (B) 182

   (C) 192

   (D) None of these   1

(ii) Zeros of the quadratic polynomial $x^2 + 7x + 10$ are :

   (A) -2, 5

   (B) -2, -5

   (C) 2, 5

   (D) None of these   1

(iii) If $\tan A = \dfrac{4}{3}$, then $\cos A$ is equal to :

   (A) $\dfrac{5}{3}$

   (B) $\dfrac{3}{5}$

   (C) $\dfrac{4}{5}$

   (D) None of these   1

(iv) The linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have infinitely solution, if :

   (A) $\dfrac{a_1}{a_2} \neq \dfrac{b_1}{b_2}$

   (B) $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$

   (C) $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$

   (D) None of these   1

BAJKLK22—8003-B   (Old)

B

(v) ABC and BDE are two equilateral triangles such that D is the midpoint of BC. Ratio of the areas of the triangles ABC and BDE is :

(A) 2 : 1

(B) 1 : 2

(C) 4 : 1

(D) 1 : 4   1

(vi) Write the first three terms of A.P. when the first term a and common difference d are as :

$$a = -2 \text{ and } d = 0$$ 1

2. Find a relation between x and y such that the point (x, y) is equidistant from the points $(7, 1)$ and $(3, 5)$.   2

3. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80°, then find $\angle$POA.   2

4. A ladder 15 m long reaches a window 10 m above the ground. Find the distance of the foot of the ladder from the base of the wall.   2

5. Use Euclid's division algorithm to find H.C.F. of 196 and 38,220.   4

6. Check whether the polynomial $x^2 + 3x + 1$ is a factor of the polynomial $3x^4 + 5x^3 - 7x^2 + 2x + 2$.   4

. Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre.   4

8. Find the roots of the quadratic equation $2x^2 - x + \frac{1}{8} = 0$ by factorization.

9. Find the area of a quadrant of a circle whose circumference is 22 cm.

10. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag, what is the probability that the ball drawn is :

   (i) red ?

   (ii) not red ?

11. Solve the pair of linear equations $3x + 4y = 10$ and $2x - 2y = 2$ by substitution method.

Or

The coach of a cricket team buys 7 bats and 6 balls for ₹ 3,800. Later, she buys 3 bats and 5 balls for ₹ 1,750. Find the cost of each bat and each ball.

12. Find the roots of the quadratic equation $2x^2 + x - 4 = 0$ by the method of completing the square.

Or

The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

XthBAJKLK22—8003-B   (Old)

B-3-B

13. Find the sum of the first 40 positive integers divisible by 6.

Or

Two A.P.'s have the same common difference. The difference between their 100th terms is 100. What is the difference between their 1,000th terms ?   6

14. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. Prove it.

Or

In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle. Prove it.   6

15. If (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.

Or

Find the values of y for which the distance between the points P(2, -3) and Q(10, y) is 10 units.   6

16. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \dfrac{1}{\sqrt{3}}$; $0° < A + B \leq 90°$; $A > B$, find A and B.

Or

Prove that :

$$\frac{\tan\theta}{1 - \cot\theta} + \frac{\cot\theta}{1 - \tan\theta} = 1 + \sec\theta\,\mathrm{cosec}\,\theta$$ 6

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B-3-B

17. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m. Find the height of the tree.

Or

The angles of depression of the top and the bottom of an 8 m tall building from the top of a multistoreyed building are 30° and 45°. respectively. Find the height of the multistoreyed building and the distance between the two buildings. https://www.jkboseonline.com   7

18. Construct a triangle with sides 5 cm, 6 cm and 7 cm and then another triangle whose sides are $\dfrac{7}{5}$ of the corresponding sides of the first triangle.

Or

Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle and measure their lengths.   7

19. 2 cubes each of volume 64 cm³ are joined end-to-end. Find the surface area of the resulting cuboid.

Or

Metallic spheres of radii 6 cm, 8 cm and 10 cm, respectively, are melted to form a single solid sphere. Find the radius of the resulting sphere.   7

XthBAJKLK22—8003-B   (Old)

B–3–B

20. Consider the following distribution of daily wages of 50 workers of a factory :

Daily Wages (in ₹)	Number of Workers
500—520	12
520—540	14
540—560	8
560—580	6
580—600	10

Find the mean daily wages of the workers of the factory by using an appropriate method.

Or

If the Median of the distribution given below is 28.5, find the values of x and y :

Class Interval	Frequency
0—10	5
10—20	x
20—30	20
30—40	15
40—50	y
50—60	5
Total	60

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$X^{th}BAJKLK22$

8003-B

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(New/Old/Old II Course)

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B-3-B

(19)

(Old II Course)

1. Choose the correct answer :

(i) Probability of an event that is certain to happen is :

(A) 0   (B) 1

(C) 2   (D) None of these   1

(ii) Roots of the equation $x^2 - 7x = 0$ will be :

(A) 7   (B) 0, –7

(C) 0, 7   (D) None of these   1

(iii) In $\triangle ABC$, $AB = 6\sqrt{3}$ cm, $AC = 12$ cm and $BC = 6$ cm. Then angle B is :

(A) 120°   (B) 60°

(C) 90°   (D) 45°   1

(iv) Volume of hemisphere is :

(A) $\frac{2}{3}\pi r^3$ (B) $\frac{1}{3}\pi r^3$

(C) $\frac{4}{3}\pi r^3$ (D) None of these   1

(v) The common point of a tangent to a circle and the circle is called :

    (A) Secant   (B) Chord

    (C) Point of contact   (D) None of these   1

(vi) Draw an angle of 60° with the help of a compass and ruler.   1

2. If $\sin\theta = \dfrac{4}{3}$, find $\cos\theta$ and $\tan\theta$.   2

3. Draw the Graph of the linear equation :

$$4x + 6y = 18$$ 2

4. Give *two* different examples of pair of non-similar figures.   2

5. Prove that the perpendicular at the point of contact to the tangent to a circle passes through the circle.   4

6. Find the quadratic polynomial, the sum and product of whose zeros are 1 and 1 respectively.   4

7. Check whether − 150 is a term of the A.P. 11, 8, 5, 2, ...   4

8. Show that $3\sqrt{2}$ is irrational.   4

9. Solve the following equations by substitution method :

$$x + y = 14$$

$$x - y = 4$$ 4

XthBAJKLK22—8003-B   (Old II)

B-3-B

10. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is :

(i) red

(ii) not red ?

4

11. Find the roots of the quadratic equation $2x^2 - 7x + 3 = 0$ by the method of completing the square.

Or

The sum of the reciprocals of Rehman's ages (in years) 3 years ago and 5 years from now is 1/3. Find his present age.

6

12. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

Or

Is it possible to design a rectangular mango grove whose length is twice its breadth and the area is 800 m² ? If so, find its length and breadth.

6

13. ABCD is a trapezium in which AB ‖ DC and its diagonals intersect each other at the point O. Show that :

$$\frac{AO}{BO} = \frac{CO}{DO}$$

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B-3-B

Turn Over

Or

If a line intersects sides AB and AC of a $\triangle ABC$ at D and E respectively and is parallel to BC, prove that :

$$\frac{AD}{AB} = \frac{AE}{AC}$$

14. In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. Prove it.

Or

In an equilateral triangle ABC, D is the point on side BC such that $BD = \frac{1}{3} BC$. Prove that :

$$9AD^2 = 7AB^2$$

15. If the points A(6, 1), B(8, 2), C(9, 4) and D(P, 3) are the vertices of a parallelogram, taken in order, find the value of P.

Or

Find the area of the quadrilateral whose vertices, taken in order, are (−4, −2), (−3, −5), (3, −2) and (2, 3).

16. Prove that :

$$\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$$

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B–3–B

Or

Prove that :

$$\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$$ 6

17. The angle of elevation of the top of a tower from a point on the ground. which is 30 m away from the foot of the tower. is 30°. Find the height of the tower.

Or

If A. B and C are interior angles of a triangle ABC, then show that :

$$\sin\left(\frac{B + C}{2}\right) = \cos\frac{A}{2}$$ 7

18. Construct a triangle of sides 4 cm, 5 cm and 6 cm and then a triangle similar to it whose sides are 2/3 of the corresponding sides of the first triangle. https://www.jkboseonline.com

Or

Draw a circle of radius 6 cm. From a point 10 cm away from its centre. Construct the pair of tangents to the circle and measure their lengths.   7

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B-3-B

19. Prove that the parallelogram circumscribing a cricle is a rhombus.

Or

Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that :

$$\angle PTQ = 2 \angle OPQ$$

7

20. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

Or

A 20 m deep well with diameter 7 m is dug and the earth from digging is evenly spread out to form a platform 22 m by 14 m. Find the height of the platform.

7