k.p.classes

K.P.CLASSES

2013 – SA – 1 (MATHEMATICS)

Class - X

Time Allowed : 3 Hrs. **Maximum Marks: 90**

General Instructions:

i) All questions are compulsory.

ii) The question paper consists of 34 questions into four sections, A, B, C and D. Section A comprises of 8 questions of 1 mark each, Section B comprises of 6 questions of 2 marks each, Section C comprises of 10 questions of 3 marks each and Section D comprises of 10 questions of 4 marks each.

iii) Use of calculators is not permitted.

Section – A

1. The decimal expansion of the rational number $\frac{33}{2^2.5}$ will terminate after
   a. one decimal place
   b. two decimal places
   c. three decimal places
   d. more than 3 decimal places
2. If the HCF of 65 and 117 is expressible in the form 65*m* – 117, then the value of *m* is
   a. 4
   b. 2
   c. 1
   d. 3
3. The pair of equations x + 2y + 5 = 0 and –3x – 6y + 1 = 0 have
   a. a unique solution
   b. exactly two solutions
   c. infinitely many solutions
   d. no solution
4. The value of (sin30° + cos30°) – (sin60° + cos60°) is
   a. – 1
   b. 0
   c. 1
   d. 2
5. The value of $\frac{\tan 30^0}{\cot 60^0}$ is
   a. $\frac{1}{\sqrt{2}}$
   b. $\frac{1}{\sqrt{3}}$
   c. $\sqrt{3}$
   d. 1
6. If ΔABC is right angled at C, then the value of cos (A+B) is
   a. 0
   b. 1
   c. 2
   d. 3
7. Sides of two similar triangles are in the ratio 4 : 9. Areas of these triangles are in the ratio
   a. 2 : 3
   b. 4 : 9
   c. 81 : 16
   d. 16 : 81
8. Arithmetic mean of 1, 2, 3, - - - - , n is
   a. $\frac{n+1}{2}$
   b. $\frac{n-1}{2}$
   c. $\frac{n}{2}$
   d. $\frac{n}{2}+1$

Section - B

9. Can the number 6^n, n being a natural number, end with the digit 5? Give reasons.
10. Can x – 1 be the remainder on division of a polynomial p (x) by 2x + 3? Justify your answer.
11. For the pair of equations
    λx + 3y = –7; 2x + 6y = 14
    to have infinitely many solutions, the value of λ should be 1. Is the statement true? Give reasons.
12. Prove that $\sin^6\theta + \cos^6\theta + 3\sin^2\theta \cos^2\theta = 1$
13. Prove that the line joining the mid-points of any two sides of a triangle is parallel to the third side.
14. The following table shows the weights of 12 students:

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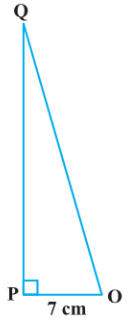
Weight (in kg)	67	70	72	73	75
Number of students	4	3	2	2	1

Find the mean weight by using short-cut method.

Section - C

15. Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and the coefficients.
16. Prove that $\sqrt{3} + \sqrt{5}$ is irrational.
17. For which values of p and q, will the following pair of linear equations have infinitely many solutions?
    $4x + 5y = 2$
    $(2p + 7q)\, x + (p + 8q)\, y = 2q - p + 1.$
18. If $\sin (A - B) = ½$, $\cos (A + B) = ½$, $0° < A + B \leq 90°$, $A > B$, find A and B.
19. In Δ OPQ, right-angled at P, OP = 7 cm and OQ – PQ = 1 cm (see Fig.). Determine the values of sin Q and cos Q.



20. Evaluate: $\frac{5\cos^2 60^0 + 4\sec^2 30^0 - \tan^2 45^0}{\sin^2 30^0 + \cos^2 30^0}$.
21. A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.
22. Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.
23. The following data gives the information on the observed lifetimes (in hours) of 225 electrical components :

Lifetimes (in hours)	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
Frequency	10	35	52	61	38	29

Determine the modal lifetimes of the components.

24. The mean of the following frequency table is 50. But the frequencies f_1 and f_2 in class 20 – 40 and 60 – 80 are missing. Find the missing frequencies.

Classes	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	Total
Frequency	17	f_1	32	f_2	19	120

Section - D

25. Show that the square of an odd positive integer can be of the form 6q + 1 or 6q + 3 for some integer q.
26. If the remainder on division of $x^3 + 2x^2 + kx + 3$ by x – 3 is 21, find the quotient and the value of k. Hence, find the zeroes of the cubic polynomial $x^3 + 2x^2 + kx - 18$.
27. Draw the graphs of the pair of linear equations x – y + 2 = 0 and 4x – y – 4 = 0. Calculate the area of the triangle formed by the lines so drawn and the x-axis.
28. If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$

    Or

    Express the ratios cos A, tan A and sec A in terms of sin A.
29. There are some students in the two examination halls A and B. To make the number of students equal in each hall, 10 students are sent from A to B. But if 20 students are sent from B to A, the number of students in A becomes double the number of students in B. Find the number of students in the two halls.
30. Prove that $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$, using the identity $\sec^2\theta = 1 + \tan^2\theta$.
31. 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

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

32. BL and CM are medians of a triangle ABC right angled at A. Prove that $4 (BL^2 + CM^2) = 5 BC^2$.
33. 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

34. The following distribution gives the daily income of 50 workers of a factory.

Daily income in (Rs.)	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200
Number of workers	12	14	8	6	10

Convert the distribution above to a less than type cumulative frequency distribution, and draw its ogive. Ans find its median.

Answers:-

1. B
2. B
3. D
4. B
5. D
6. A
7. D
8. A
9.
10. No, since degree (x – 1) = 1 = degree (2x + 3).
11. No.
12.
13.
14. 70.25
15. The zeroes of $x^2 + 7x + 10$ are – 2 and – 5.
16.
17. p = –1, q = 2
18. A = 45° and B = 15°.
19. $\sin Q = \frac{7}{25}, \cos Q = \frac{24}{25}$
20. $\frac{67}{12}$
21. Shadow is 1.6 m long
22.
23. 65.625 hours
24. $f_1 = 28 \ and \ f_2 = 24.$
25.
26. k = –9; Quotient is $x^2 + 5x + 6$; zeroes are are 3, – 2, – 3..
27. The vertices of this triangle are B (–2, 0), Q (1, 0) and R (2, 4). Area = 6 sq. units
28.
29. 100 students in hall A, 80 students in hall B.
30.
31.
32.
33. x = 8, y = 7.
34. Table is

Daily income (in Rs.)	Cumulative frequency
Less than 120	12
Less than 140	26
Less than 160	34
Less than 180	40
Less than 200	50

Draw ogive by plotting the points : (120, 12), (140, 26), (160, 34), (180, 40) and (200, 50)