BANGALORE SAHODAYA SCHOOLS COMPLEX ASSOCIATION (BSSCA)
PRE-BOARD EXAMINATION (2022-2023

Subject : MATHEMATICS (Code No.041) - SET 1

Maximum Marks : 80 Time Allowed: 3 Hrs.

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. Three numbers are in the ratio 3:4:5 and their LCM is 1200. Then their HCF is _____

(a) 40 (b) 60 (c) 20 (d) 120

2. If a and b are the zeroes of a polynomial $px^2–5x+q$, then the values of p and q, if a+b=ab=10, are___

(a) 5 and ½ (b) 5 and 2 (c) ½ and 5 (d) 10 and 1

3. The pair of linear equation x+2y=5 and 3x+12y=10 has_____

(a) unique solution (b) no solution (c) more than two solutions (d) infinitely many solutions

4. If the equation $x^2 – bx+1 = 0$ does not possess real roots, then _____

(a) $–3 < b < 3$ (b) $–2 < b < 2$ (c) $b > 2$ (d) $b < –2$

5. In ΔABC and ΔDEF, $\angle B=\angle E, \angle F =\angle C$ and $AB = 3DE$. Then, the two triangles are

(a) congruent but not similar

(b) similar but not congruent

(c) neither congruent nor similar

(d) congruent as well as similar

6. For points (2,3) and (x,0), distance is 3. Then x is equal to _____

(a) 2 (b) 3 (c) -2 (d) –3

7. If $\sin \theta = ½$ and θ is an acute angle, then $(3 \cos \theta - 4 \cos^3 \theta)$ is equal to

(a) 0 (b) ½ (c) 1/6 (d) –1

8. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°, the ∠POA is equal to _____

(a) 50° (b) 60° (c) 70° (d) 80°

9. The radius of a bicycle wheel is 14cm. The distance covered by the wheel after making 50 complete rotations is _____

(a) 88cm (b) 2200 cm (c) 440 cm (d) 4400 cm

10. If $\Delta ABC \sim \Delta EDF$ and ΔABC is not similar to ΔDEF, then which of the following is not true ?

(a) BC.EF = AC.FD (b) AB.EF=AC.DE (c) BC.DE = AB.EF (d) BC.DE = AB.FD

11. The midpoint of the line segment joining the points A (-2, -5) and B (2,5) is _____

(a) (0,0) (b) (0,2) (c) (2,0) (d) (–2, 0)

12. If $4 \tan \theta = 3$, then $\frac{4 \sin \theta - \cos \theta}{4 \sin \theta - \cos \theta}$ is equal to _____

(a) 2/3 (b) 1/3 (c) ½ (d) ¾

13. If $\Delta PQR \sim \Delta XYZ$, $\angle Q = 50°$ and $\angle R = 70°$, then $\angle X + \angle Y$ is equal to _____

(a) 70° (b) 110° (c) 120° (d) 50°

14. The cumulative frequency of a given class is obtained by adding the frequencies of all the classes _____

(a) preceding it (b) succeeding it (c) Both (a) and (b) (d) None of these

15. If the probability of an event is p, the probability of its complementary event will be _____

(a) p –1 (b) p (c) 1 – p (d) 1 – 1/p

16. The mean of five numbers is 10. If each number is decreased by 3, mean of the new number is _____

(a) 13 (b) 10 (c) 7 (d) None of these.

17. A cylindrical pencil sharpened at one edge is the combination of _____

(a) a cone and a cylinder (b) a hemisphere and a cylinder

(c) two cylinders (d) None of the above.

18. In a circle of radius 21cm, an arc subtends an angle of 60° at the centre. The length of the arc is _____

(a) 11cm (b) 22cm (c) 27 cm (d) 44 cm

Directions : In the question nos. 19 & 20, a statement of assertion (A) is followed by a statement of reason (R) . Choose the correct choice.

19. Assertion (A) : If the circumference of a circle is 176 cm, then its radius is 28 cm.

Reason (R) Circumference = 2π x radius

(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 but 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. Assertion (A) : The sum or difference of a rational number and an irrational number is irrational.

Reason (R) : Negative of an irrational number is rational

(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 but 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.

Section B

Section B consists of 5 questions of 2 marks each

21. For what value of ***p*** does the pair of linear equations given below have unique solution ? $4x + py + 8=0$ and $2x + 2y + 2 = 0$?

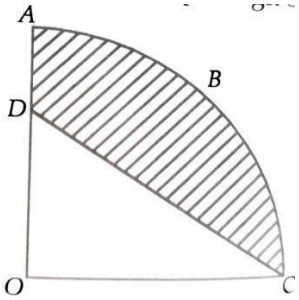
22. From a point T outside a circle of centre O, tangents TP and TQ are drawn to the circle. Prove that OT is the right bisector of line segment PQ.

23. In a triangle PQR, ST ∥ QR and $\frac{PS}{SQ} = \frac{3}{5}$ and PR = 28 cm , find PT.

24. If the perimeter of a protractor is 72 cm, calculate its area (Use π = 22/7)

(OR)

In the figure given below, OABC is a quadrant of a circle of radius 7cm. If OD = 4cm, find the area of the shaded region.



25. Express the trigonometric ratios sec A and tan A in terms of sin A.

(OR)

Prove that : $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$

Section C

(Section C consists of 6 questions of 3 marks each)

26. Prove that $5 - \sqrt{3}$ is irrational given that $\sqrt{3}$ is irrational.

27. If a and β are zeros of a polynomial $x^2 + 6x + 9$, then form a polynomial whose zeroes are $-a$ and $-\beta$.

28. A train travelling at a uniform speed for 360 km would have taken 48 minutes less to travel the same distance if its speed were 5 km/hour more. Find the original speed of the train.

(OR)

Solve for x : $\frac{x+1}{x-1} + \frac{x-2}{x+2} = 4 - \frac{2x+3}{x-2}$; $x \neq 1, -2, 2$

29. The incircle of a ΔABC touches the sides AB, BC and CA at P, Q, R respectively. Show that AP + BQ + CR = PB + QC + RA = ½ (Perimeter of ΔABC)

30. If tan(A+B) = 1 and tan (A-B) = $\frac{1}{\sqrt{3}}$, $0° < A+B < 90°$, $A > B$, then find the values of A and B.

(OR)

If $7\sin^2 A + 3\cos^2 A = 4$, show that $\tan A = \frac{1}{\sqrt{3}}$

31. Two coins are tossed simultaneously. Find the probability of getting :

(a) two heads (b) atmost one head (c) no head

Section D

(Section D consists of 4 questions of 5 marks each)

32. A man sold a chair and a table together for Rs. 1520 thereby making a profit of 25% on chair and 10% on table. By selling them together for Rs. 1535, he would have made a profit of 10% on the chair and 25% on the table. Find the cost price of each.

(OR)

Places A and B are 80 km apart from each other on a highway. A car starts from A and another from B at the same time. If they move in the same direction, they meet in 8 hours and if they move in opposite directions, they meet in 1 hour 20 minutes. Find the speed of the two cars.

33. (i) Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio. (3 marks)

(ii) ABCD is a trapezium in which AB ∥ DC and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$ (2 marks)

34. Water is flowing through a cylindrical pipe of internal diameter 2 cm, into a cylindrical tank of base radius 40 cm, at the rate of 0.4 m/s. Determine the rise in level of water in the tank in half an hour. **(OR)**

A solid wooden toy is in the form of a hemisphere surmounted by a cone of same radius. The radius of hemisphere is 3.5 cm and the total wood used in the making of toy is $166\frac{5}{6}$ cm^3.

Find the height of the toy. Also find the cost of paiting the hemisphere part of the toy at the rate of Rs. 10 per cm^2 (use $\pi = \frac{22}{7}$)

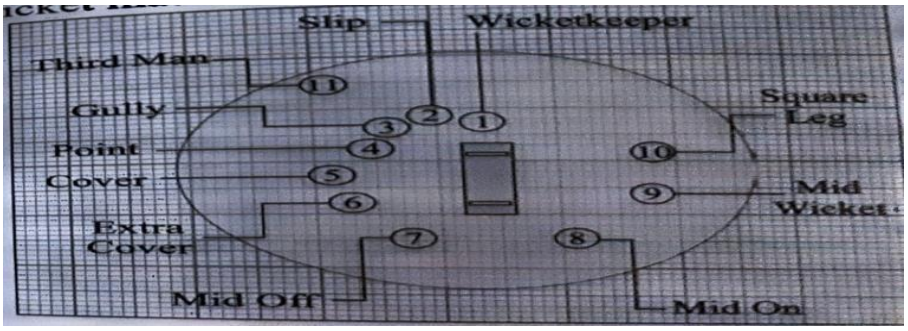
35. The median of the following data is 525. Find the values of x and y if the total frequency is 100.

Class Interval	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
Frequency	2	5	x	12	17	20	y	9	7	4

Section E

(Case Study based questions, 3 compulsory questions of 4 marks each)

36. In the sport of cricket the Captain sets the field according to a plan. He instructs the players to take a position at a particular place. There are two reasons to set a cricket field- to take wickets and to stop runs being scored. The following graph shows the position of players during a cricket match.



(i) If the distance between the points showing the players at Gully A (1,0) and wicketkeeper at B (4,p) is 5 m, then p =_____ (1 mark)

(ii) The ratio in which (4,5) divides the line segment joining the points Extra Cover S (2,3) and Fine leg (7,8) is _____ (1 mark)

(iii) If the points (4,3) and (x,5) are on the circular field with centre (2,4) then find the value of x. (2 marks)

37. Clinometer is a tool used to measure the angle of elevation. We can use a clinometer to measure the height of tall things, ie, flag poles, towers, buildings , tree etc.

Study some results after using clinometer :

R_1 : 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°

R_2 : The elevation of the sun is 30°

Refer R_1 :

(i) The height of the tower is _____ (1 mark)

(ii) In case, the angle of elevation is 60°, then the height of the tower is _____ (1 mark)

Refer R_2 :

(iii) The length of the shadow cast by a tower of 150 m height is_____ (2 marks)

38. Pranav wants to buy a car and plans to take a loan from the bank for his car. He repays his total loan of Rs. 1,18,000 by paying every month staring with the first instalment of Rs. 1000. If he increases the instalment by Rs.100 every month, answer the following: (i) Find the amount paid by him in the 30^{th} instalment. (ii) Find the total amount paid by him in 30 instalments. (iii) It total instalments are 40, then find the amount paid in the last instalment.