Mathematics SA -2 Sample paper-3

Time allowed: 3 hours Maximum Marks: 90

General Instructions:
a) All questions are compulsory.
b) The question paper consists of 31 questions divided into four sections – A, B, C and D.
c) Section A contains 4 questions of 1 mark each which are multiple choice questions, Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 11 questions of 4 marks each.
d) Use of calculator is not permitted.

Section A

1. The ratio in which the line segment joining points P (a, b) and P (c, d) is divided by x axis is
a) b : d
b) -b: d
c) a: c
d) -a: c

2. A solid sphere of radius r cm is melted and recast into the shape of a solid cone of height r. Then the radius of the base of cone is
a) 2r
b) r
c) 4r
d) 3r

3. A box contains 3 blue, 2 white and 4 red marbles. If a marble is drawn at random from the box, the probability that it will not be a white marble is:
(a) 2/9
 (b) 4/9
 (c) 5/9
 (d) 7/9

4. A sector is cut from a circle of radius 21 cm. The angle of sector is 150o. The area of sector is
(A) 577.5 cm2
(B) 288.2 cm2
(C) 152 cm2
(D) 155 m2

Section B

5. The length of a rectangle exceeds its width by 8 cm and the area of the rectangle is 240 sq. cm. Find the dimensions of the rectangle

6. If the diameter of the semicircular protractor is 1 cm, then find its radius?

7. The length of the tangent from a point X at a distance 5 cm from the center of the circle is 4 cm. Find the area of the circle

8. A car has wheels which at 80cm in diameter. How many complete revolutions does each wheel make in 10 min when the car is travelling at a speed of 66 km/hr.

9. A solid metallic sphere of radius 12 cm is melted and recast into a number of small cones, each of radius 4 cm and height 3 cm. Find the number of cones so formed.

10. Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level of water in the tank will rise by 21 m.

Section C

11. For what values of p, the roots of the quadratic equation $(p + 4) x^2 + (p+ 1) x + 1 = 0$ are equal?

12. Find the sum of all two digit natural numbers which when divided by 3 yield 1 as remainder.

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

14. From the top of a hill 200 m high, the angles of depression of the top and the bottom of a pillars are 30^0 and 60^0 respectively. Find the height of the pillar and its distance from the hill

15. In an AP, if $Sn = 3n^2 + 5n$ and $a_k = 164$, find the value of k.

16. Find the maximum volume of a cone that can be carved out of a solid hemisphere of radius r

17. Prove that the points (3, 0), (6, 4) and (−1,3) are vertices of a right angled triangle. Also, prove that the vertices of an isosceles triangle.

18. A copper wire when bent in the form of a square encloses an area of 121 cm2. If the same wire is bent into the form of a circle, then find the area of the circle. (use π=22/7)

19. Find the sum of the two middle most terms of the AP

$$\frac{-4}{3}, \ -1, \ \frac{-2}{3}, \ \text{.........}, \ 4\frac{1}{3}$$

20. A hemispherical bowl of internal radius 9 cm is full of liquid. The liquid is to be filled into cylindrical shaped small bottles each of diameter 3 cm and height 4 cm. How many bottles are needed to empty the bowl?

Section D

21. A motorboat whose speed in still water is 18 km/h, takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

22. The radii of two cylinders are in the ratio 3: 2 and their heights are in the ratio 7: 4. Calculate the ratios of their volumes and of the cured surface areas.

23. The opposite angular points of a square is (3,4) and (1.-1). Find the coordinates of the other angular points

24. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre.

25. If points A (1,-2) B(2,3) C(p,2) and D(-4,-3) forms a parallelogram. Find the value of p and Height of the parallelogram with AB as base

26. Draw a line segment AB of length 11 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle

27. The angle of elevation of the top of tower from point A due south of tower is α and from point B due east of tower is β. What is the height of the tower?

28. There are 500 sealed envelopes in a box, 10 of them contain a cash prize of Rs. 100 each, 50 of them contains a cash prize of Rs. 50 each and 100 of them contain a cash price of Rs. 10 each, and the rest do not contain any cash price. If they are well shuffled and then an envelope is picked up out, what is the probability that it contains
(i) no cash
(ii) cash prize of Rs 100

29. If P (2, –1) divides the join of A (–4, 8) and B (4, –4) in the ratio K:1, find the coordinates of a point which divides the join of A and B in the ratio 1: K.

30. Four equal circles each of radius of diameter d, touch each other. Show that area between them is $3d^2/14$ (Use π= 22/7)

31. A gulabjamun when completely ready for eating contains sugar syrup up to about 30% of its volume. Find approximately how many syrup would be found in 45 gulabjamun shaped like a cylinder with two hemisphere ends, if complete length of the gulabjamun us 5 cm and its radius is 2.4cm