Mathematics SA -2 Sample paper-5

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. Which of the following cannot be the probability of an event?
(a)1/4
(b) 0.6
(c) 5 %
(d)20/19

2. The radii of the ends of a frustum of a cone 40 cm high are 38 cm and 8 cm. The slant height of the frustum of cone is
a) 50 cm
b) 10√7 cm
c) 60.96 cm
d) 4√2 cm

3. Find the roots of the quadratic equation $9x^2 + 12x + 4 = 0$.
4. The circumferences of two circles are in the ratio 2:3. The ratio of their areas is
(A) 4:9
(B) 2:3
(C) 7:9
(D) 4:10

Section B

5. By the method of completion of squares show that the equation $4x^2 + 3x + 5 = 0$ has no real roots
6. In an A.P, the sum of the first n terms is $(3n^2 + 5n)/2$. Find the 24^{th} term?
7. If QA and QB are tangents from an outside point Q such that QA =10 cm and Angle AQB is 60^0 . Find the length of the chord AB
8. The radii of two circles are 3 cm and 4 cm. Find the radius of the circle whose area is equal to

the sum of areas of two circles.
9. 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.

10. A die is thrown twice. What is the probability that
(i) 5 will not come up either time? (ii) 5 will come up at least once?

Section C

11. The sum of the square of the two consecutive numbers is 265, find the integers

12. Find the sum of all two digit natural numbers which when divided by 3 yield 1 as remainder.
13. Construct a triangle of sides 4cm,5cm and 6 cm and then a triangle similar to it whose sides is 2/3 of the corresponding sides of it
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. How many three digit numbers are divisible by 7?
16. Find the relation between a and b if the points (a, b), (1, 2) and (7, 0) are collinear
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 cm^2. If the same wire is bent into the form of a circle, then find the area of the circle. (use π=22/7)
19. The circumference of a circular plot is 220 m. A 15 m wide concrete track runs around outside the plot. Find the area of the track. (use π=22/7)

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. If the equation $(1 + m^2)x^2 + 2mcx + (c^2 – a^2) = 0$ has equal roots, prove that $c^2 = a^2 (1 + m^2)$

22. A trader bought a number of articles for Rs.900. Five articles were found damaged. He sold each of the remaining articles at Rs.80 in the whole transaction. Find the number of articles he bought.
23. The radius of the incircle of a triangle is 4 cm and segments into which one side is divided by the contact are 6 cm and 8 cm. Find the other two sides of the triangle?

24. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠ PTQ = 2∠ OPQ.
25. Prove that Parallelogram circumscribing a circle is rhombus

26. Sum of the area of the two squares are is 468 m^2, if the difference of the their perimeter is 24 m, then find the sides of the squares.

27. The angle of elevation of the top of a vertical tower from a point on the ground is 60°. From another point 10 m vertically above the first, its angle of elevation is 45°. Find the height of the tower.

28. A Urn contains 3 white balls, 6 red balls, 7 green balls and 3 blue balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is:
(i) Green
(ii) not blue
(iii) neither white nor blue
(iv) red or white

29. A park is in the form of rectangle 120 m by 100 m. At the center of the park, there is a circular lawn. The area of the park excluding the lawn is 11384 sq. m. Find the radius of the circular lawn.
30. Two metallic right circular cones having their heights 4.1 cm and 4.3 cm and radii of their bases 2.1 cm each, have been melted together and recast into a sphere. Find the diameter of the sphere
31. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm, find the total surface area of the article. (Use = 3.14 π)