SUMMATIVE ASSESSMENT-II, 2013
MATHEMATICS

Time: 3 Hours

Class-X

Maximum Marks: 90

General Instructions:

(i) The question paper compulsory.

(ii) The question paper consists of 34 questions divided 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) Question numbers 1 to 8 in Section-A are multiple choice questions where you are required to select one correct option out of the given four.

(iv) There is no overall choice.

(v) Use of calculator is not permitted.

Section-A

Questions numbers 1 to 8 carry one mark each. For each questions, four alternative choices have been provided of which only one is correct. You have to select the correct choice.

1. The product of two consecutive integers is 420. We can represent this by a quadratic equation, as:
   
   (a) \( x + (x+1) = 420 \)  
   (b) \( x(x+1) = 420 \)  
   (c) \( x^2 + (x + 1) = 420 \)  
   (d) \( x + (x+1)^2 = 420 \)  
   
2. In the given figure AT is a tangent to the circle. IF \( \angle OAT = 25^\circ \), then \( \angle AOP \) is:

   \( \angle AOP = \) ?

   (a) \( 115^\circ \)  
   (b) \( 75^\circ \)  
   (c) \( 50^\circ \)  
   (d) \( 90^\circ \)  

(I)
3. To divide a line segment AB in the ratio 3:8, a ray AX is to be drawn making an acute angle then points A₁, A₂, A₃, ..........A₁₁ are located on AX are equal distance. Next step is to join:

(a) A₁ to B  
(b) A₈ to B  
(c) A₁₁ to B  
(d) A₉ to B

4. The length of the ladder which is inclined at an angle of 30° to the horizontal and reaches a wall of height 12 m, is:

(a) 12m  
(b) 20m  
(c) 24m  
(d) 30m

5. The probability of getting a perfect square number from the number 1 to 10 is:

(a) \(\frac{3}{10}\)  
(b) \(\frac{1}{2}\)  
(c) \(\frac{2}{5}\)  
(d) \(\frac{\sqrt{2}}{5}\)

6. Which of the following cannot be the probability of an event:

(a) \(\frac{1}{3}\) 
(b) 0.7  
(c) 15%  
(d) 1.5

7. The distance between the origin and (3x, 3y) is:

(a) 3x² + 3y² 
(b) \(3\sqrt{x² + y²}\)  
(c) \(\sqrt{x² + y²}\)  
(d) \(\sqrt{3(x² + y²)}\)

8. The ratio of the areas of the incircle and circumcircle of a square is:

(a) 1 : 2  
(b) 1 : 3  
(c) 1 : 4  
(d) 1 : \(\sqrt{2}\)

Section-B

Question number 9 to 14 carry two marks each.

9. The 7th term of an AP is 32, 13th term is 62, find the arithmetic progression.

10. Solve the equation \(x + \frac{1}{x} = 4\frac{1}{4}\) where x is whole number and
11. TC is a tangent drawn to a circle with centre O. If $\angle ACS = 60^\circ$, find $\angle TAC$, $\angle AOC$ and $\angle AOB$.

12. PC is tangent to the circle with centre O at C. AOB is the diameter, when extended meets the tangent at P. Find $\angle CBA$, given that $\angle PCA = 130^\circ$ Also find $\angle AOC$ and $\angle BCO$.

13. A bag contains cards which are numbered from 2 to 90. A card is drawn at random from the bag. Find the probability that the drawn card bears:

(a) a two digit number,  
(b) a number which is perfect square.

14. If $r_1$ and $r_2$ be the radii of two solid metallic spheres and if they are melted into one solid sphere, prove that the radius of the new sphere is $\left(\frac{r_1^3 + r_2^3}{3}\right)^{\frac{1}{3}}$.

Section-C

Question numbers 15 to 24 carry three marks each.

15. Find the value of $x$, from the given figure.

[Diagram showing a right-angled triangle with sides $x+1$, $x+3$, and $x-1$.]
16. Solve: \( \frac{x + 3}{x + 2} = \frac{3x - 7}{2x - 3} \)

17. If angle between two tangents drawn from a point P to a circle of radius ‘a’ and centre O is 60°, then prove that \( AP = a\sqrt{3} \)

18. The angles of elevation of a cloud from a point 200 m above a lake 30° and the angle of depression of the reflection of the cloud in the lake is 60°. Find the height of the cloud from the surface of the lake.

19. Three vertices of a parallelogram are \((-1, 2), (4, 3)\) and \((7, 6)\) respectively. Find the fourth vertex.

20. Determine the ratio in which the line \( y - x + 2 = 0 \) divides the line segment joining the points \((3, -1)\) and \((8, 9)\)

21. Find the volume of an iron bar in the shape of a cuboid whose length, breadth and height measures 25 cm, 18 cm and 6 cm respectively. Find also its weight in kg if 1 cm³ of iron weighs 100 grams.

22. A heap of wheat is in the form of a cone whose diameter is 10.5 m and height is 3 m. If 1 m³ of space of just sufficient to store 1500 kg of wheat, find the quantity of wheat stored in the conical heap. \( \text{Use } \pi = \frac{22}{7} \)

23. A solid is composed of cylinder with hemispherical ends. If the whole length of the solid is 108 cm and the diameter of the hemispherical ends is 36 cm, find the cost of polishing surface area at rate of 7 paise/cm².

24. A spherical shell of lead whose external and internal diameters are 24 cm and 18 cm respectively is melted and recast into a right circular cylinder 37 cm high. Find the radius of the base of the cylinder.
25. If the quadratic equation \((1 + m^2) x^2 + 2 m c x + (c^2 - a^2) = 0\) has two equal roots in \(x\), \(c^2 = a^2 (1 + m^2)\)

26. The roots of the quadratic equation \((a^2 + b^2) x^2 - 2 (ac + bd) x + (c^2 + d^2) = 0\) are equal. Prove that \(\frac{a}{b} + \frac{c}{d}\)

27. A takes 3 days longer than B to finish a work. But if they work together, then work is completed in 2 days. How long would each take to do it separately. Can you say cooperation helps to get more efficiency?

28. Construct an equilateral \(\Delta\) of side 6.5 cm each. Draw another triangle similar to it such that its side is times the side of the given \(\Delta\).

29. Draw a line segment \(MN = 6\) cm. With M as centre draw a circle of radius 3.5 cm. From N construct a pair of tangents to this circle and measure their lengths.

30. The angle of elevation of an aeroplane from a point on the ground, is 45°. After 15 second of flight the angle changes to 30°. If the plane is flying at a constant height of 2500 m, find the speed of the plane.

31. A box contains 90 discs which are numbered from 5 to 94. If one disc is drawn at random from the box, find the probability that it bears

(i) a two digit number (ii) a perfect square number

(iii) a number divisible by 7 (iv) a number which is divisible by 10

32. A \((1, 0)\), B \((5, 3)\), C \((2, k)\) and D \((-2, 4)\) are the vertices of a quadrilateral ABCD. Find the value of \(k\), if the area of quadrilateral is 25 sq. unit.

33. The area of an equilateral triangle is 1732.05 cm². About each angular point as centre a circle is described with radius equal to half the length of the side of the triangle. Find the area of the triangle not included in the circle (Use)

34. The ratio of outer and inner perimeters of a circular path is 23 : 22. If the path is 5 m wide, find the diameter of the inner circle.