C–3–X

Roll No.....

Total No. of Questions : **20**] [Total No. of Printed Pages : **8**

XWZJDRO/N19

24703–X

MATHEMATICS

Time : 3 Hours] **[Maximum Marks : 100**

Note : Attempt all questions.

1. (i) In a cricket match, a batswoman hits a boundary 6 times out of 30 balls she plays. The probability that she did not hit a boundary is :

(A) $\frac{1}{5}$ (B) $\frac{2}{5}$

(C) $\frac{4}{5}$ (D) None of these

(ii) A line segment of length 20 cm is divided in the ratio of 3 : 1, the measure of the two parts in the given ratio respectively would be :

(A) 15 cm, 5 cm (B) 5 cm, 15 cm

(D) 12 cm, 8 cm (D) None of these

(iii) The 10th term of the A.P. 2, 7, 12, ... is :

(A) 27 (B) 37

(C) 47 (D) None of these

(iv) Total surface area of cylinder with radius r and height h is :

(A) $2\pi rh$ (B) $2\pi r\ (r + h)$

(C) πrl (D) None of these

(v) Quotient of a rational and irrational number is :

(A) a rational number (B) an irrational number

(C) an integer (D) None of these

(vi) If α and β are the zeroes of the quadratic polynomial $2x^2 + 3x + 4$, then $\alpha + \beta$ is :

(A) $-\frac{3}{2}$ (B) $\frac{3}{2}$

(C) 2 (D) None of these $1\times6=6$

2. Find the distance between the points (a, b) and $(-a, -b)$. 2

3. Evaluate :

$$2\tan^2 45° + \cos^2 30° - \sin^2 60°$$ 2

4. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80°, then find ∠POA. 2

5. Find the sum of first 51 terms of an A.P. whose second and third terms are 14 and 18 respectively. 4

6. Find the H.C.F. of 96 and 404 by the prime factorisation method. Hence, find their L.C.M. 4

7. Solve the following pair of linear equations by the substitution method :

$$3x - 5y - 4 = 0$$

and

$$9x = 2y + 7$$ 4

8. For which value of k will the following pair of linear equations have no solution ?

$$3x + y = 1$$

$$(2k - 1)x + (k - 1)y = 2k + 1$$ 4

9. Divide the polynomial $p(x)$ by the polynomial $g(x)$ and find the quotient and remainder :

$$p(x) = x^4 - 5x + 6,$$

$$g(x) = 2 - x^2$$ 4

10. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting :

(i) a king of red colour

(ii) the queen of diamonds 4

11. Find the roots of the quadratic equation $2x^2 + x - 4 = 0$ by the method of completing the square.

Or

A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. Find the speed of the train. 6

12. Find the nature of the roots of the quadratic equation :

$$2x^2 - 6x + 3 = 0.$$

Also find the roots of this equation if they exist.

Or

Find two consecutive odd positive integers, sum of whose squares is 290. 6

13. If AD and PM are medians of triangles ABC and PQR, respectively where $\Delta ABC \sim \Delta PQR$, prove that :

$$\frac{AB}{PQ} = \frac{AD}{PM}$$

Or

Diagonals of a trapezium ABCD with AB || DC intersect each other at the point O. If AB = 2 CD, find the ratio of the areas of triangles AOB and COD. 6

14. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Or

D and E are points on the sides CA and CB respectively of a triangle ABC right-angled at C. Prove that :

$$AE^2 + BD^2 = AB^2 + DE^2$$ 6

15. Find the ratio in which the line segment joining the points (–3, 10) and (6, –8) is divided by (–1, 6).

Or

If A(–5, 7), B(–4, –5), C(–1, –6) and D(4, 5) are the vertices of a quadrilateral, find the area of the quadrilateral ABCD. 6

16. Given that $\sec \theta = \frac{13}{12}$, calculate all other trigonometric ratios.

Or

Prove that :

$$(\text{cosec } \theta - \cot \theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$$ 6

17. From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.

Or

The angles of depression of the top and the bottom of on 8 m tall building from the top of a multi-storeyed building are 30° and 45° respectively. Find the height of the multi-storeyed building and the distance between the two buildings. 7

18. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

Or

Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle. 7

19. Draw a triangle ABC with side BC = 7 cm, $\angle B = 45°$, $\angle A = 105°$. Then, construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of ΔABC.

Or

Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 60°. 7

20. A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel.

Or

A metallic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm. Find the height of the cylinder. 7