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PT2 2023-24
MATHEMATICS, CLASS :X

TIME $1\frac{1}{2}$ Hrs Max. Marks: 40

SECTION A

Section A consists of 20 questions of 1 mark each

1. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
(a) 10 (b) 100 (c) 504 (d) 2520

2. The L.C.M. of smallest prime and smallest composite number is
(a) 1 (b) 2 (c) 3 (d) 4

3. If α and β are the zeros of a polynomial $f(x) = px^2 – 2x + 3p$ and $\alpha + \beta = \alpha\beta$, then p is
(a)-2/3 (b) 2/3 (c) 1/3 (d) -1/3

4. A quadratic polynomial whose zeroes are -3 and 4 is
(a)$x^2 - x + 12$ (b) $x^2 + x + 12$ (c) $\frac{x^2}{2} - \frac{x}{2} - 6$ (d) $2x^2 + 2x - 24$

5. If the system of equations 3x+y =1 and (2k-1)x +(k-1)y =2k+1 is inconsistent, then k =
(a) -1 (b) 0 (c) 1 (d) 2

6. The pair of equations x+2y+3=0 and -3x-6y+1= 0 have
(a) a unique solution (b) exactly two solutions
(c) infinitely many solutions (d) no solution

7. The value of k for which the equations 3x-y+8=0 and 6x+ky= -16 represent coincident lines is
(a) $-1/2$ (b) ½ (c) 2 (d) -2

8. Let p be a prime number. The quadratic equation having its roots as factors of p is
(a) $x^2 –px +p=0$ (b) $x^2–(p+1)x +p=0$ (c) $x^2+(p+1)x +p=0$ (d) $x^2 –px+p+1=0$

9. if ½ is a root of the equation $x^2 + kx - \frac{5}{4} = 0$ then the value of k is
(a) $-1/2$ (b) ½ (c) 2 (d) -2

10. If the quadratic equation $x^2 + 4x + k = 0$ has real and equal roots, then 1
(a) $k < 4$ (b) $k > 4$ (c) $k = 4$ (d) $k \geq 4$

11. The sum of first five multiples of 3 is
(a) 45 (b) 55 (c) 65 (d) 75

12. 30th term of the A.P. 10,7,4,……. Is
(a) 97 (b) 77 (c) -77 (d) -87

13. ΔABC~ΔPQR. If AM and PN are altitudes of ΔABC and ΔPQR respectively and $AB^2: PQ^2 = 4 : 9$, then AM: PN =
(a) 3:2 (b) 16:81 (c) 4:9 (d) 2:3

14. If in two triangles ABC and PQR $\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$ then
(a) $\Delta PQR \sim \Delta CAB$ (b) $\Delta PQR \sim \Delta ABC$ (c) $\Delta CBA \sim \Delta PQR$ (d) $\Delta BCA \sim \Delta PQR$

15. If the vertices of a parallelogram PQRS taken in order are P(3,4), Q(-2,3) and R(-3,-2), then the coordinates of its fourth vertex S are
(a) (-2,-1) (b) (-2,-3) (c) (2,-1) (d) (1,2)

16. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is
(a) 5 units (b) 12 units (c) 11 units (d) $(7 + \sqrt{5})$ units

17. In which ratio the y-axis divides the line segment joining the points (5, – 6) and (–1, – 4)?. 1
(a) 1 : 5 (b) 5 : 1 (c) 1 : 1 (d) 1 : 2

18. $\sqrt{3}\cos^2 A + \sqrt{3}\sin^2 A$ is equal to

(a) 1 (b) $\sqrt{3}$ (c) ½ (d) 1

19. If sinθ + cosθ = $\sqrt{2}$, then tanθ + cot θ =

(a) 1 (b) 2 (c) 3 (d) 4

20. If Sin A=1/2 then Cos 2A is

(a) ½ (b) $\sqrt{3}/2$ (c) $1/\sqrt{2}$ (d) 1

Section B

Case Study Based Questions

21. In the month of April to June 2022, the exports of passenger cars from India increased by 26% in the corresponding quarter of 2021–22, as per a report. A car manufacturing company planned to produce 1800 cars in 4^{th} year and 2600 cars in 8th year. Assuming that the production increases uniformly by a fixed number every year

Based on the above information answer the following questions

(i) Find the production in the 1^{st} year. (1)

(ii) Find the production in the 12^{th} year (1)

(iii) Find the total production in first 10 years. (2)

[OR]

In which year the total production will reach to 15000 cars?

22.Aayush starts walking from the house to office instead of going to the office directly, he goes to the bank first, from there to his daughter's school and then reaches the office.(Assume that all distances covered are in straight lines). If the house is situated at (2 , 4) bank at (5 , 8), school at (13 , 14) and office at (13, 26) and coordinates are in km.

(i) Find the distance between house and bank (1)

(ii) Bank and daughter's school. (1)

(iii)What is the total distance travelled by Aayush to reach the office? (2)

Section C

23. Show that $7 - \sqrt{5}$ is irrational given that $\sqrt{5}$ is irrational. (2)

24. If a and b are the zeroes of polynomial $x^2 - 4\sqrt{3}x+3$ then find the values of a+b-ab (2)

25. If the roots of the equation $(c^2 - ab)x^2 - 2\left(a^2 - bc\right)x + b^2 + ac = 0$ in x are equal, then show that either a=0 or $a^3 + b^3 + c^3 = 3abc$ (3)

26. Two right-triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P , prove that AP × PC = BP × DP (3)

27. Prove that :$\frac{\sqrt{1-cosA}}{\sqrt{1+\cos cos\, A}} = cosecA - cotA$

(2)