US-MC-24 **krishnakumar** 10M-SF

Full Portion Test - 2

Standard X

MATHEMATICS

Time : 3.00 hrs. Maximum Marks : 100

Instructions: 1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

2) Use Black or Blue ink to write and underline and pencil to draw diagrams.

PART - I

14x1=14

Note: i) Answer all the questions.

ii) Choose the most suitable answer from the given four alternatives and write the option code and the corresponding answer.

1. If $n(A \times B) = 6$ and $A = \{1,3\}$ then $n(B)$ is
   a) 1 b) 2 c) 3 d) 6

2. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then $f \circ g$ is
   a) $\frac{3}{2x^2}$ b) $\frac{2}{3x^2}$ c) $\frac{2}{9x^2}$ d) $\frac{1}{6x^2}$

3. If the HCF of 65 and 117 is expressible in the form of $65m - 117$, then the value of m is
   a) 4 b) 2 c) 1 d) 3

4. The value of $(1^3 + 2^3 + 3^3 + \ldots + 15^3) - (1 + 2 + 3 + \ldots + 15)$ is
   a) 14400 b) 14200 c) 14280 d) 14520

5. Graph of a linear equation is a
   a) straight line b) circle c) parabola d) hyperbola

6. If A is 2×3 matrix and B is a 3×4 matrix, the number of rows in BA is
   a) 3 b) 4 c) 2 d) None of these

7. In ΔLMN, $\angle L = 60^\circ$, $\angle M = 50^\circ$. If $\Delta LMN \sim \Delta PQR$, then the value of $\angle R$ is
   a) 40° b) 70° c) 30° d) 110°

8. If (5,7), (3,p) and (6,6) are collinear, then the value of p is
   a) 3 b) 6 c) 9 d) 12

9. The slope of the line which is perpendicular to a line joining the points (0,0) and (−8, 8) is
   a) −1 b) 1 c) $\frac{1}{3}$ d) −8

10. $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \operatorname{cosec}\theta)$ is equal to
    a) 0 b) 1 c) 2 d) −1

11. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}:1$, then the angle of elevation of the sun has measure

a) 45° b) 30° c) 90° d) 60°

12. If two solid hemispheres of same base radius r units are joined together along their bases, then curved surface area of this new solid is

a) $4\pi r^2$ sq. units b) $6\pi r^2$ sq. units c) $3\pi r^2$ sq. units d) $8\pi r^2$ sq. units

13. The range of the data 8, 8, 8, 8, 8, . . . 8 is

a) 0 b) 1 c) 8 d) 3

14. Which of the following values cannot be a probability of an event?

a) 0 b) 0.5 c)1.06 d) 1

Part - II

Note: i) Answer any ten questions. 10x2=20

ii) Question No.28 is compulsory.

15. If $A \times B = \{(3,2)(3,4)(5,2)(5,4)\}$ then find A and B.

16. Given $f(x) = 2x - x^2$ find $f(x) + f(1)$.

17. Show that the square of an odd integer is of the form $4q+1$, for some integer q.

18. In the G.P. 729, 243, 81, ... find t_7.

19. Find the excluded values of the expression $\dfrac{7p+2}{8p^2+13p+5}$.

20. If $A = \begin{bmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{bmatrix}$ then find the transpose of $-A$.

21. In a ΔABC, $DE \parallel BC$, $AD = x$, $DB = x-2$, $AE = x+2$ and $EC = x-1$, then find the lengths of the sides AB and AC

22. If radii of two concentric circles are 4 cm and 5 cm, then find the length of the chord of one circle which is a tangent to the other circle.

23. Find the slope of a line joining the points $(\sin\theta, -\cos\theta)$ and $(-\sin\theta, \cos\theta)$.

24. Find the angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of a tower of height $10\sqrt{3}$ m.

25. If the ratio of radii of two spheres is 4 : 7, find the ratio of their volumes.

26. Find the standard deviation of first 21 natural numbers.

27. Three fair coins are tossed together. Find the probability of getting atmost one head.

28. Find the angle between the straight lines $x = a$ and $by + c = 0$.

Part - III

10x5=50

Note: i) Answer any ten questions.
ii) Question No.42 is compulsory.

29. Let $f: A \to B$ be a function defined by $f(x) = \frac{x}{2} - 1$, where $A = \{2,4,6,10,12\}$, $B = \{0,1,2,4,5,9\}$. Represent f by (i) a set of ordered pairs (ii) a table (iii) an arrow diagram (iv) a graph

30. If $f(x) = x^2$, $g(x) = 3x$ and $h(x) = x - 2$, prove that $(f \circ g) \circ h = f \circ (g \circ h)$

31. The sum of first n, 2n and 3n terms of an A.P are S_1, S_2 and S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$.

32. If $x^4 - 8x^3 + mx^2 + nx + 16$ is a perfect square, find the values of m and n.

33. If $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{bmatrix}$, show that $(AB)^T = B^T A^T$.

34. State and prove Pythogras theorem.

35. Find the area of the quadrilateral whose vertices are $(-9,0), (-8,6), (-1,-2)$ and $(-6,-3)$.

36. If the sum and product of two intercepts are 1 at -6 respectively. Find the equations of straight line.

37. From the top of a light house, the angle of depression of two ships on the opposite sides of it are observed to be 30° and 60°. If the height of the light house is 'h' metres and the line joining the ships passes through the foot of the light house. Show that the distance between the ships is $\frac{4h}{\sqrt{3}}$ m

38. The radius of a sphere is increases by 25%, find the percentage increase in its surface area.

39. A cone of height 24 cm is made up of modeling clay. A child reshapes it in the form of a cylinder of same radius as cone. Find the height of the cylinder.

40. Find the standard deviation of first n natural numbers.

41. Three unbiased coins are tossed once. Find the probability of atmost getting 2 tails or atleast 3 heads.

42. In a G.P. If the fourth term is 4, then find the product of its first 7 terms.

Part - IV

2x8=16

Note: Answer the following questions:

43. a) Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{6}{5}$ of the corresponding sides of the tirangle ABC (scale factor $\frac{6}{5} > 1$)

(OR)

b) Construct a ΔPQR which the base $PQ = 4.5$ cm; $\angle R = 35^\circ$ and the median RG from R to PQ is 6 cm.

44. a) Draw the graph of $xy = 24, x, y > 0$. Using the graph find,

i) y when $x = 3$ and ii) x when $y = 6$

(OR)

b) Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$.

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