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Model Examination July – 2019

Sri Vidya Mat.Hr.Sec.School,Virudhunagar

Standard – 11 MATHEMATICS

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Time : 1.30 Hrs

Marks : 50

I. Choose the correct answer with option :**10 × 1 = 10**

- The rule $f(x) = x^2$ is a bijection if the domain and the co domain are given by
a) \mathbb{R}, \mathbb{R} b) $\mathbb{R}, (0, \infty)$ c) $(0, \infty), \mathbb{R}$ d) $[0, \infty), [0, \infty)$
- The number of relations on a set containing 3 elements is
a) 9 b) 81 c) 512 d) 1024
- If $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(n) = n^2$ for
a) Injective b) Surjective c) Bijective d) Not bijective
- If 3 is the logarithm of 343, then base is
a) 5 b) 7 c) 6 d) 9
- If $\frac{|x-2|}{x-2} \geq 0$ then x belongs to
a) $[2, \infty)$ b) $(2, \infty)$ c) $(-\infty, 2)$ d) $(-2, \infty)$
- If $x = \sqrt{x+20}$ for $x \in \mathbb{R}$ then
a) $x = 5$ b) $x = 4$ c) $x = -5$ d) $x = -4$
- If $f(\theta) = |\sin \theta| + |\cos \theta|$, $\theta \in \mathbb{R}$, then $f(\theta)$ is in the interval
a) $[0, 2]$ b) $[1, \sqrt{2}]$ c) $[1, 2]$ d) $[0, 1]$
- Which of the following is not true ?
a) $\sin \theta = -\frac{3}{4}$ b) $\cos \theta = -1$ c) $\tan \theta = 25$ d) $\sec \theta = \frac{1}{4}$
- Value of $\sin 600^\circ \tan 690^\circ + \sec 840^\circ \cot -945^\circ$
a) $\frac{3}{2}$ b) $-\frac{3}{2}$ c) $\frac{5}{2}$ d) $-\frac{5}{2}$
- If $\sin \theta = \frac{3}{5}$ and the angle θ is in the second quadrant then $\cot \theta$
a) $-\frac{4}{3}$ b) $-\frac{3}{4}$ c) $-\frac{4}{5}$ d) $-\frac{3}{5}$

II. Answer any Four questions Q.No 14 is compulsory**4 × 2 = 8**

- In the set \mathbb{Z} of integers, define mRn if $m - n$ is a multiple of 12. Prove that R is an equivalence relation.
- Find the range of the function $\frac{1}{2 \cos x - 1}$
- Solve $3x - 9 \geq 0, 4x - 10 \leq 6$
- Show that $\tan 75^\circ + \cot 75^\circ = 4$
- Prove that $\frac{\sin \theta + \sin 2\theta}{1 + \cos \theta + \cos 2\theta} = \tan \theta$
- Prove $\log \frac{75}{16} - 2 \log \frac{5}{9} + \log \frac{32}{243} = \log 2$

III. Answer any Four questions Q.No 20 is compulsory**4 × 3 = 12**

17. A circular metallic plate of radius 8 cm and thickness 6 mm is melted and molded in to a pie (a sector of a circle with thickness) of radius 16 cm and thickness 4 mm .Find the angle of the sector.
18. If $A \times A$ has 16 elements $S = \{(a, b) \in A \times A: a < b\}$; $(-1, 2)$ and $(0, 1)$ are two elements of S. then find the remaining element of S.
19. Find the number of solutions of $x^2 + |x - 1| = 1$
20. If $x^2 + x + 1$ is a factor of the polynomial $3x^3 + 8x^2 + 8x + a$ then find the value of a.
21. Prove that $\tan 315^\circ \cot(-405^\circ) + \cot 495^\circ \tan(-585^\circ) = 2$
22. If $x = \sqrt{2} + \sqrt{3}$ find $\frac{x^2+1}{x^2-2}$

IV. Answer the following questions

4 × 5 = 20

23. Resolve into partial fractions $\frac{x}{(x^2+1)(x-1)(x+2)}$

(OR)

If one root of $k(x - 1)^2 = 5x - 7$ is a double the other root, show that $k = 2$ (or) -25

24. (i) If $f, g: R \rightarrow R$ defined by $f(x) = |x| + x$ and $g(x) = |x| - x$ find $g \circ f$ and $f \circ g$.
(ii) Prove that product of an odd function and an even function is an odd function.

(OR)

If $\cot \theta (1 + \sin \theta) = 4m$ and $\cot \theta (1 - \sin \theta) = 4n$ prove that $(m^2 - n^2)^2 = mn$

25. If $x \cos \theta = y \cos \left(\theta + \frac{2\pi}{3}\right) = z \cos \left(\theta + \frac{4\pi}{3}\right)$ find the value of $xy + yz + zx$.

(OR)

Use induction to prove that $n^3 - 7n + 3$ is divisible by 3, for all natural numbers n .

26. (i) Simplify find the value of $n : \frac{3^{2n} 9^{23-n}}{3^{3n}} = 27$

(ii) Find the No. of subsets of A if $A = \{x: x = 4n + 1, 2 < n < 5, n \in \mathbb{N}\}$

(OR)

(i) From the curve $y = \sin x$, draw the graph of $y = \sin|x|$ (ii) prove that $\tan\left(\frac{\pi}{4} + \theta\right) \tan\left(\frac{3\pi}{4} + \theta\right) = -1$

Prepared by

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