TEST PAPER – 13(Green Way Spl.)
Mathematics – XI

Time : 3 hr **Max Marks : 100**

General Instructions :

1. All questions are compulsory.

2. The question paper consists of **29 questions** divided into three sections **A, B** and **C.** **Section A** comprises of **10** questions of **one mark** each, **Section B** comprises of **12** questions of **four marks** each and **Section C** comprises of **07** questions of **six marks** each.

3. All questions in **Section A** are to be answered in one word, one sentence or as per the exact requirement of the question.

4. There is no overall choice. However, internal choice has been provided in **04** questions of **four marks** each and **02** questions of **six marks** each. You have to attempt only one of the alternatives in all such questions.

5. Use of calculators is not permitted. You may ask for logarithmic tables, if required.

SECTION – A

(1) Test the validity of the assignment of probabilities **{ 0.1, 0.2, 0.3, 0.4, 0.3, – 0.2, – 0.1 }.**

(2) If**, A = {1, 2, {3, 4}}** be any set, then find the biggest subset of the set **A.**

(3) Let **A** and **B** be two sets such that n **(A) = 3** and n **(B) = 2.** If $(x, 1), (y, 2), (z, 1)$ are in **A × B,** find **A** and **B,** where x, y and z are distinct elements.

(4) Find **P(A),** the power set of the set **A,** if **A = {1, {2, 3}}**

(5) Solve the inequalitiy $\frac{5 - 2x}{3} \le \frac{x - 5}{6}$, for real x.

(6) Solve the inequation graphically **y < x.**

(7) If **'A'** and **'B'** are any two events such that **P(A) = 0.42, P(B) = 0.48** & **P(A∩B) = 0.16.** Determine **P(A** but not **B)**

(8) Evaluate **:** $\lim_{x \to 0} \{ \operatorname{cosec} x - \cot x \}$

(9) Find the derivative of $\frac{x.\cos x}{x - \tan x}$

(10) The point **(1, 1)** lies inside or outside to the circle $x^2 + y^2 - 8x + 10y - 12 = 0$

P.T.O

SECTION – B

(11) A college awarded **38** medals in football**, 15** in basketball and **20** in cricket. If these medals went to a total of **58** men and only three men got medals in all the three sports**,** how many received medals in exactly two of the three sports **?**

OR

Find the domain and range of the function $f(x) = \sqrt{4x - x^2}$

(12) If $z = x + iy,\ z^{1/3} = a - ib$ and $bx - ay = k.ab\,(a^2 - b^2)$, then find the value of **'k'.**

(13) In Δ **ABC,** Prove that **:** $\tan A + \tan B + \tan C = \tan A.\tan B.\tan C$

(14) Using principle of mathematical induction prove that,

For all $n \geq 1$, $\dfrac{1}{3.5} + \dfrac{1}{5.7} + \dfrac{1}{7.9} + \text{- - -} + \dfrac{1}{(2n+1)(2n+3)} = \dfrac{n}{6n+9}$

(15) How many litres of water will have to be added to **1125** litres of the **45%** solution of acid so that the resulting mixture will contain more than **25%** but less than **30%** acid content **?**

(16) Find the number of words with or without meaning which can be made using all the letters of the word **AGAIN.** If these words are written as in a dictionary**,** what will be the 50^{th} word**?**

(17) Let **S** be the sum**, P** the product and **R** the sum of reciprocals of n terms in a **G.P.** Prove that $P^2 R^n = S^n$.

OR

If **p, q, r** are in **G.P.** and the equations**,** $px^2 + 2qx + r = 0$ and $dx^2 + 2ex + f = 0$ have a common root**,** then show that **d / p , e / q , f / r** are in **A.P**

(18) Find the equation of the line through the point **(3 , 2)** and which makes an angle 45^o with $x - 2y = 3$.

(19) Find the equation of the circle whose centre is **(3 , –1)** and which cut off an intercept of length **6** from the line $2x - 5y + 18 = 0$.

OR

Find the **vertex, focus, latus rectum, axis** and **directrix** of the parabola **:** $4y^2 + 12x - 20y + 67 = 0$

(20) A point **R** with x-coordinate **4** lies on the line segment joining the points **P(2, –3, 4)** and **Q (8, 0, 10).** Find the coordinates of the point **R.**

(21) Evaluate **:** $\lim\limits_{x \to 1} \left\{ \dfrac{x-2}{x^2 - x} - \dfrac{1}{x^3 - 3x^2 + 2x} \right\}$

OR

Using first principle find the derivative of the function $f(x) = \cot (x)^{1/3}$.

(22) Find the probability that when a hand of **7** cards is drawn from a well shuffled deck of **52** cards it contains **(i)** all kings **(ii)** at least **3** kings

OR

Three letters are dictated to three persons and an evelope is addressed to each of them**,** the letters are inserted into the envelopes at random so that each envelope contains exactly one letter**.** Find the probability that at least one letter is in its proper envelope

SECTION – C

(23) Prove the following **:**

(i) $\cos^2 x + \cos^2 (x + \pi / 3) + \cos^2 (x - \pi / 3) = 3 / 2$ **.**

(ii) $2\cos (\pi / 13) . \cos (9\pi / 13) + \cos (3\pi / 13) + \cos (5\pi / 13) = 0$ **.**

(24) In how many ways can the letters of the word **PERMUTATIONS** be arranged if the

(i) vowels are all together**,**

(ii) there are always **4** letters between **P** and **S ?**

(25) A ray of light is sent along the line $x - 2y = 3$**.** Upon reaching the line $3x - 2y = 5$**,** the ray is reflected from it. Find the equation of the line containing the reflected ray**.**

OR

Find the equation of the straight line passing through the point **(–2 , –7)** and having an intercept of length **3** between the straight lines $4x + 3y = 12$ and $4x + 3y = 3$**.**

(26) Show that **:** $\dfrac{1 \times 2^2 + 2 \times 3^2 + - - - + n \times (n + 1)^2}{1^2 \times 2 + 2^2 \times 3 + - - - + n^2 \times (n + 1)} = \dfrac{3n + 5}{3n + 1}$ **.**

(27) The mean and standard deviation of **20** observations are found to be **10** and **2,** respectively**.** On rechecking**,** it was found that an observation **8** was incorrect**.** Calculate the correct mean and standard deviation if the wrong item is replaced by **12.**

(28) Prove that **:** $\cos 20^\circ . \cos 40^\circ . \cos 60^\circ . \cos 80^\circ = 1 / 16$ **.**

OR

Solve for **'x' :** $\tan x + \sec x = \sqrt{3}$**.**

(29) Find ***a*, *b*** and ***n*** in the expansion of $(a + b)^n$ if the first three terms of the expansion are **729, 7290** and **30375,** respectively**.**

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