Roll No. _____ **NLCS/10/Mathematics (Standard)/50**

Half Yearly Examination 2024 – 2025

Time - 3:00 Hrs. **M.M. 80**

General Instruction:

1. This Question Paper has 5 Sections A-E.
2. **Section A** has 20 MCQs carrying 1 mark each.
3. **Section B** has 5 questions carrying 02 marks each.
4. **Section C** has 6 questions carrying 03 marks each.
5. **Section D** has 4 questions carrying 05 marks each.
6. **Section E** has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided.
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated

Section – A

Multiple Choice Questions : Each Question One Mark.

Q.1 The largest number which divides 70 and 125 living reminder 5 and 8 respectively is

(a) 10 (b) 13 (c) 875 (d) 1750

Q.2 If α and β are the zeros of the quadratic polynomial x^2-5+k such that $\alpha-\beta=1$ then k is :

(a) 2 (b) 3 (c) 4 (d) 6

Q.3 Sum of two numbers is 35 and their differences 13 find the numbers :

(a) 35, 12 (b) 24, 11 (c) 73, 60 (d) 26, 9

Q.4 $x-4=\frac{12}{x}$ then value of x are :

(a) –2, –6 (b) 6, 2 (c) 6, –2 (d) –6, 2

Q.5 The value of p if numbers $x, 2x+p, 3x+6$ are 3 consecutive terms of an AP is :

(a) 3 (b) 2 (c) 5 (d) 7

Q.6 If in a triangle ABC and $DEF, \frac{AB}{DE}=\frac{BC}{FD}$ then they will be similar when

(a) Angle Bequals to angul E (b) Angle A = angle D

(c) Angle B = angle D (d) Angle A = angle F

Q.7 The distance of the point p (- 3 - 4) from the x-axis (in units) is :

(a) 3 (b) –3 (c) 4 (d) 5

Q.8 If $\sin\theta+\cos\theta=1$ then the value of $\sin\theta.\cos\theta=$

(a) 1 (b) 0 (c) –1 (d) 2

Q.9 If a pole 6m high cast a shadow to $2\sqrt{3}$ m long on the ground then the sun's evolution angle is–

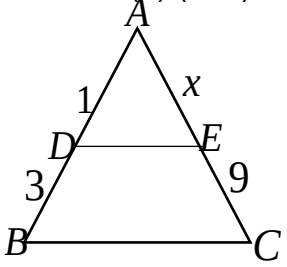
(a) 60 (b) 30 (c) 45 (d) 90

Q.10 Find the centroid of the triangle whose vertices are (4 – 8), (–9,7), (8,13) :

(a) (1, 4) (b) (4, 1) (c) (4, 0) (d) (0, 4)

Q.11 In the figure if the DE|| BC then the value of x is :

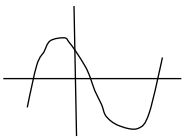
(a) 4 (b) 3 (c) 8 (d) None of these



Q.12 The pair of equations X = a and Y = b graphically represents lines which are

(a) Parallel (b) Intersecting at (b, a) (c) Coincident (d) Intersecting at (a,b)

Q.13 In the figure the graph of a polynomial P(X) is shown.
The numbers of zeros of P(X) is :



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

Q.14 If x and y are two positive odd prime numbers such that x greater than y then x^2-y^2 is :
(a) An even number (b) An odd number (c) An odd prime (d) Prime number

Q.15 The fourth term from the end of the AP – 11 ,– 8, – 5 ……., 49 is
(a) 37 (b) 40 (c) 43 (d) 58

Q.16 In right triangle ABC , right angled at B ,if tan A = 1 then 2 sin A cos A =
(a) 1 (b) –1 (c) 0 (d) ½

Q.17 A tower is 100 √3 m high from a point on ground angle of elevation of its top is 45 the distance of that point from foot of tower is
(a) 100 m (b) 100 (√3 + 1) (c) 10 metre (d) 100 √ 3 metre

Q.18 Find the common difference "d" for AP of $\sqrt{12}, \sqrt{108}, \sqrt{192}$:
(a) $\sqrt{3}$ (b) $2\sqrt{3}$ (c) $\sqrt{9}$ (d) $\sqrt{12}$

DIRECTION: In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option

Q.19 **Assertion (A)** ; the roots of the equation $x^2+2x+4=0$ are imaginary
Reason (R) : if for the quadratic equation $x^2+bx+c=0$, b not equals 0, b^2-4ac lower then 0 , then it's roots are imaginary

Q.20 **Assertion (A)** : π is an irrational number
Reason (R) : $\sqrt{-5}$ is an irrational number

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Section – B (Each question 2 marks.)

Q.21 Prove that 5 + 6 √7 is irrational.

OR

If the HCF (336 ,54) = 6, find LCM.

Q.22 If a x + b y = a²+ b² and b x + ay = 0 then find the value of (x + y).

OR

Find the value of $x+y$, if $3^{(x+y)}=243$ and $(243)^{x-y}=3$.

Q.23 Two triangle 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.

Q.24 If the point C (–1, 2), divide internally the line segment joining A (2, 5) and B (x, y) in the ratio 3 : 4, find the coordinates of B.

Q.25 If $x\cos\theta-y\sin\theta=a$, $x\sin\theta+y\cos\theta=b$, prove that $x^2+y^2=a^2+b^2$.

Section – C (Each Question 3 marks)

Q.26 One fourth of a herd of camels was seen in the forest twice the square root of the heard had gone to mountains and the remaining 15 camels were seen on the bank of a river find the total number of camels.

OR

A Shopkeeper buys a number of books for rupees 1200 if he had brought 10 more books for same amount each book would have cost him rs 20 less. How many books did he buys.

Q.27 The sum of three consecutive terms of an A.P. is 21 and the product is 231 find the numbers.

OR

Divide 32 into 4 parts which are in AP such that the product of extremes to the product of means is 7: 15.

Q.28 Prove that a line drawn through the midpoint of one side of a triangle parallel to another side bisect the third side

Q.29 In what ratio does the line x – y – 2=0 , divide the line segment joining (3, –1) and (8, 9).

Q.30 An equilateral triangle is inscribed in a circle of radius 6 cm, find its side

Q.31 Prove that $\sin^8\theta - \cos^8\theta = (\sin^2\theta - \cos^2\theta)(1 - 2\sin^2\theta\cos^2\theta)$.

Section – D

Each Question 5 marks :

Q.32 A ladder resets against a wall at an angle Alpha to the horizontal 8 foot is pulled away from the wall thought a distance a so that it's slides a distance b down the wall making an $\angle\beta$ with the horizontal show that $\frac{a}{b} = \frac{\cos\alpha - \cos\beta}{\sin\beta - \sin\alpha}$.

OR

Prove the following identities :

(i) $\frac{(1+\cot\theta+\tan\theta)(\sin\theta+\cos\theta)}{\sec^3\theta\,\mathrm{cosec}^3\theta} = \sin^2\theta\cos^2\theta$

(ii) $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$

Q.33 Draw the graph of the pair of equation $2x + y = 4$ and $2x - y = 4$. Write the vertices of the triangle formed by these lines and the y axis also find the area of the triangle

Q.34 If(– 4, 3) and(4,3)are two vertex of an equilateral triangle find the coordinates of the third vertex given that the origin lies in the interior of triangle

OR

Find the centre of a circle passing through the points (6 ,– 6),(3 ,– 7) and (3, 3)

Q.35 Prove that the line segments joining the mid points of the sides of a triangle from four triangles each of which is similar to the original triangle

Section – E

Each Question 4 marks :

Q.36 Riya being a plant lover decided to open a nursery and she brought few plants with pots she wants to place pots in such a way that number of pots in first row is 3 in the second row is 5 and in third row is 7 and so on.

(i) If Riya wants to plant 120 in total then find the total number of rows formed in this arrangement

(a) 10 (b) 21 (c) 12 (d) 15

(ii) How many ports are placed in last row?

(a) 10 (b) 21 (c) 12 (d) 15

(iii) Find the difference in numbers of pots placed in 8^{th} through and 3^{rd} row :

(a) 10 (b) 21 (c) 10 (d) 15

OR

Find the number of pots in the 4^{th} row from the last row.

(a) 10 (b) 12 (c) 21 (d) 15

Q.37 The rod AB of a TV dish antenna is fixed at right angle to the wall and a rod BC is supporting the dish as shown in the figure AB = 4 cm and BC = 8 cm.

Now answer the following :

(i) Find the value of $\tan\theta$.

(a) $\frac{1}{\sqrt{3}}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

(ii) Find the value of Θ :

(a) 30 (b) 45 (c) 60 (d) 90

(iii) Find the value of sin ²C + sin ² B :

(a) $\frac{1}{\sqrt{3}}$ (b) $\frac{1}{2}$ (c) 1 (d) 0

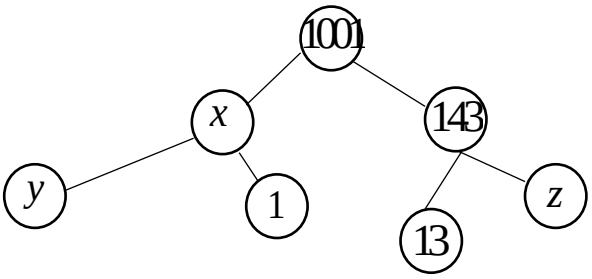
OR

Find the value of sin A + tan B :

(a) $1+\sqrt{3}$ (b) $1-\sqrt{3}$ (c) $\sqrt{3}$ (d) 2–√3

Q.38 Every composite number can be expressed as a product of prime and this factorization is unique apart from the order in which the prime factors occur a child makes a factor tree during his project submission as a shown.

Answer the following questions :



(i) What will be the value of x

(a) 5 (b) 3 (c) 7 (d) 11

(ii) What will be the value of y

(a) 5 (b) 3 (c) 7 (d) 11

(iii) What will be the value of z :

(a) 5 (b) 3 (c) 7 (d) 11

OR

Find the HCF of first prime number and first composite number :

(a) 5 (b) 3 (c) 2 (d) 7

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