The Mahakal Tutorial
Rashtriya Indian Military College Dehradun

Candidate Name:- _____ **CET-01** **Maximum Time:- 1:30 hr**

New Pattern

Instructions

1. Attempt all 20 questions.
2. Part 'A' contains 10 questions each question in this part carries 8 marks.
3. Part 'B' contains 10 questions each question in this part carries 12 marks.
4. Attempt all questions step by step.
5. Marks are awarded on the basis of steps.

All the best

Mathematics

Part -A (10 x 8 = 80)

1. A vase in a flower shop contains ten identical red and four identical pink roses. If you would like to pick one red and two pink ones, in how many ways can you do this?
2. When a number is divided by 5, the remainder is 2. What is the remainder when the number is multiplied by 8 and then divided by 5?
3. Find all natural numbers n for which $2^n + 1$ is divisible by 3.
4. A train moves at a constant speed. It takes 10 seconds for the entire train to pass a standing observer, and it takes 30 seconds for the entire train to completely cross a bridge 400 meters long. What is the length of the train (in meters)?
5. It is known that $\frac{x+y}{x-y} + \frac{x-y}{x+y} = 3$. Find the value of $\frac{x^2+y^2}{x^2-y^2} + \frac{x^2-y^2}{x^2+y^2}$.
6. A rectangular sheet of paper is folded so that one corner bisects the lower side, as shown in the figure above. Triangles I and II are congruent. If the length of the short side of the sheet of paper is 8, find the length of the long side.
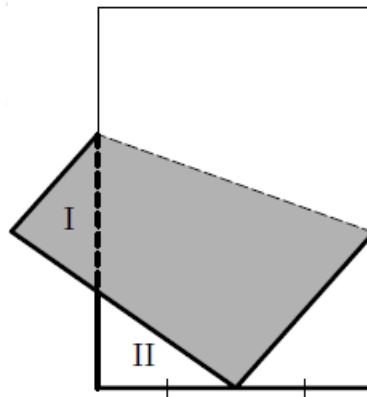

7. The casing of a cylindrical sausage is marked with thin transverse rings. If it is cut along the red rings, you get 5 pieces. Cutting along the yellow rings produces 7 pieces, and

cutting along the green rings, produces 11 pieces. How many pieces are obtained from this sausage if you cut all these colored rings?

8. Find a + b + c if a, b, and c are positive integers satisfying
$$abc + 2ab + 2bc + 2ca + 4a + 4b + 4c = 447$$

9. What is the sum of all positive integers n such that $6n$ is divisible by $1 + 2 \dots . + n$?

10. In a triangle with integer side lengths, one side is three times as long as a second side, and the length of the third side is 15. What is the difference between the greatest and the least possible perimeters of the triangle?

Part -A (10 x 12 = 120)

11. A family consists of a mother, a father, and several children. The average age of the members of the family is 20, the father is 48 years old, and the average age of the mother and children is 16. How many children are in the family?

12. Several children ate some candy. Each child ate 7 pieces fewer than all the other children ate together, and each ate more than one piece of candy. How many pieces were eaten in all?

13. An acute isosceles triangle ABC is inscribed in a circle. Through B and C, tangents to the circle are drawn, meeting at D. If ∠ABC = 2∠CDB, then find the radian measure of ∠BAC.
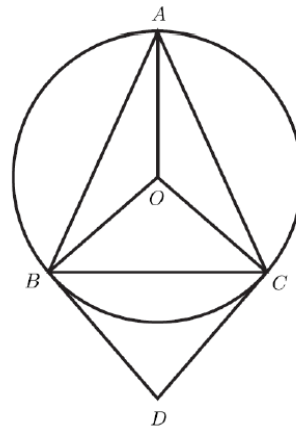
14. A currency exchange office conducts two types of trades:
    a) In exchange for 2 euros, you get 3 dollars plus a complimentary piece of candy.
    b) In exchange for 5 dollars, you receive 3 euros plus a complimentary piece of candy.
    When Barney enters the exchange office, he has only dollars. When he leaves, he has fewer dollars, no euros, and 50 pieces of candy. How many dollars did he spend on these "complimentary" candies?

15. Rooster, Raven, and Cuckoo took part in a singing contest. Each judge voted for one of the three participants. Woodpecker counted 59 judges, with 15 judges voting for Rooster or Raven, 18 voting for Raven or Cuckoo, and 20 voting for Cuckoo or Rooster. Woodpecker counts poorly; however, each of the four numbers he counted above differ from reality by no more than 13. How many judges voted for Raven?

16. A man can do a piece of work in 30 hours. If he works with his son then the same piece of work is finished in 20 hours. If the son works alone, he can do the work in how many days?

17. There were basketballs and footballs in a sports complex. The number of basketballs is 5/7 the total number of balls. If 45 basketballs are spoilt and disposed and the number of remaining basketballs is now half the total number of balls, what is the total number of balls left.

18. In a circle, chords PQ and TS are produced to meet at R. if RQ = 14.4 cm, PQ = 11.2 cm, and SR = 12.8 cm, Find the length of chord TS ?

19. Among Neptune's servants are octopuses with six, seven, and eight legs. Those with seven legs always lie, while those with six or eight legs always tell the truth. Four octopuses meet.
    The blue one says, "Together we have 28 legs. "
    "Together we have 27 legs," says the green one.
    "Together we have 26 legs," says the yellow one.
    "Together we have 25 legs," says the red on
    How many legs does each octopus have?

20. A balance of trader weighs 20% less than it should be. Still the trader marks-up his goods to get the overall profit of 35%. What are marks-up on the cost price?