VYDEHI SCHOOL OF EXCELLENCE
MID -TERM EXAMINATION (2019-20)
SUBJECT: MATHEMATICS
CLASS: X

Date: 05/08/2019

Time: 3 Hours
Maximum Marks: 80

General Instructions -

- Please read all the questions carefully.
- All questions are compulsory. Do draw an ending line after each answer.
- Do not copy the questions. Mention only the question numbers.
- This question paper consists of four sections A,B,C and D. Section A consists of 1 mark questions, Section B consists of 2 marks questions, Section C consists of 3 marks questions, and Section D consists of 4 marks questions.

SECTION–A

(20 × 1= 20)

1. If the sum of n terms of an A.P. be $3n^2 + n$ and its common difference is 6, then its first term is
   a) 5 b) 3 c) 1 d) 4

2. If the distance between the points (4,p) and (1,0) is 5, then p=
   a) ± 4 b) 4 c) -4 d) 0

3. The value of k for which the system of equations $2x + 3y = 5$ and, $4x + ky = 10$ has infinite number of solutions is
   a) 1 b) 3 c) 6 d) 0

4. Sides of two similar triangles are in ratio 4: 9. Areas of these triangles are in ratio
   a) 2:3 b) 4:9 c) 81:16 d) 16:81

5. If the sum of the zeros of the polynomial $f(x) = 2x^3 - 3kx^2 + 4x - 5$ is 6, then the value of k is
   a) 2 b) 4 c) -2 d) -4

6. The LCM of two numbers is 1200. Which of the following cannot be their HCF?
   a) 600 b) 500 c) 400 d) 200

7. If A and B are complementary angles, then
   a) sin A = sin B b) cos A = cos B
   c) tan A = tan B d) sec A = cosec B

8. If two zeros of the cubic polynomial $ax^3 + bx^2 + cx + d$ are each equal to zero, then the third zero is
   a) $-\frac{d}{a}$ b) $\frac{c}{a}$ c) $-\frac{b}{a}$ d) $\frac{b}{a}$

9. If a pair of linear equations in two variables is consistent, then the line represented by the two equations are
a) intersecting
b) parallel
c) always coincident
d) intersecting or coincident

10. The sum of first 20 odd natural numbers is
a) 100
b) 210
c) 400
d) 420

11. The height of a vertical pole is $\sqrt{3}$ times the length of its shadow on the ground, then the angle of elevation of the sun at that time is
a) 30°
b) 60°
c) 45°
d) 75°

12. A man goes 24 m due west and then 7 m due north. How far is he from the starting point?
a) 31 m
b) 17 m
c) 25 m
d) 26 m

13. $(\sec A + \tan A)(1 - \sin A) =$
a) sec A
b) sin A
c) cosec A
d) cos A

14. The line segment is of length 10 units. If the coordinates of one end are (2 , -3) and the abscissa of the other end is 10, then its ordinate is
a) 9, 6
b) 3, -9
c) -3 , 9
d) 9, - 6

15. If $x \tan 45° \cos 60° = \sin 60° \cot 60°$, then x =
a) 1
b) $\sqrt{3}$
c) $\frac{1}{2}$
d) $\frac{1}{\sqrt{2}}$

16. The zeros of the quadratic polynomial $x^2 + ax + a$, $a \neq 0$,
a) cannot both be positive
b) cannot both be negative
c) are always unequal
d) are always equal

17. In an isosceles triangle ABC if AC= BC and $AB^2 = 2AC^2$, then $\angle C =$
a) 30°
b) 45°
c) 90°
d) 60°

18. If the point P (x, y) is equidistant from A (5, 1) and B(-1, 5), then
a) 5x = y
b) x = 5y
c) 3x = 2y
d) 2x = 3y

19. If $am \neq bl$, then the system of equations $ax + by = c$ and $lx + my = n$
a) has a unique solution
b) has no solution
c) has infinitely many solutions
d) may or may not have a solution

20. The first three terms of the A.P. respectively are $3y - 1$, $3y + 5$ and $5y + 1$. Then y =
a) – 3
b) 4
c) 5
d) 2

SECTION–B

(6 × 2= 12)

21. If α and β are the zeros of the polynomial $x^2 - 6x + a$, find the value of 'a' if $3\alpha + 2\beta = 20$.

22. Solve the following pair of linear equations in two variables by substitution method:

$3x - 5y - 4 = 0$ and $9x = 2y + 7$.

23. Show that square of any positive integer is of the form $3m$ or $3m + 1$ for some integer m.

24. Determine if the points $(1, 5)$, $(2, 3)$ and $(-2, -11)$ are collinear.

25. A father is three times as old as his son. After 12 years, his age will be twice as that of his son then. Find their present ages.

26. In ΔABC, D and E are the points on the sides AB and AC respectively, such that $DE \parallel BC$. If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, find the value of x.

SECTION–C

$(8 \times 3 = 24)$

27. The 8^{th} term of an A.P. is 37 and its 12^{th} term is 57. Find the A.P.

28. If $A + B = 90°$, prove that

$$\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}} = \tan A$$

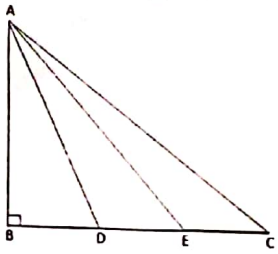
29. If zeros of the polynomial $x^2 - px + q$, be in the ratio 2 : 3, prove that $6p^2 = 25q$.

30. The angle of elevation of a jet fighter from a point A on the ground is 60°. After a flight of 15 seconds, the angle of elevation changes to 30°. If the jet is flying at a speed of 720 km/hour, find the constant height at which the jet is flying. ($\sqrt{3} = 1.732$)

31. A (6,1), B(8, 2) and C (9, 4) are three vertices of parallelogram ABCD. If E is the mid-point of DC, find the area of Δ ADE.

32. Find the largest number which divides 245 and 1029 leaving remainder 5 in each case.

33. In the given figure, D and E trisect BC. Prove that $8\,AE^2 = 3AC^2 + 5AD^2$.



34. Solve the following system of linear equations graphically:
$x - y = 1$ and $2x + y = 8$.
Shade the area bounded by these two lines and y-axis. Also, determine this area.

SECTION–D

(6 × 4 = 24)

35. State and prove Pythagoras theorem.

36. Prove that $5 - 2\sqrt{3}$ is an irrational number.

37. The sum of first 4 terms of an A.P. is 40 and that of first 14 terms is 280, find the sum of its first n terms.

38. A man travels 370 km partly by train and partly by car. If he covers 250 km by train and rest by car, it takes him 4 hours. But if he travels 130 km by train and the rest by car, he takes 18 minutes longer. Find the speed of the train and that of the car.

39. Prove that

$$\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\text{cosec } A - 1}{\text{cosec } A + 1}$$

40. If the point P (x, y) be equidistant from the points A (a+b, b-a) and B (a-b, a+b), prove that bx = ay.