CENTRAL PUBLIC SCHOOL

TAJPUR ROAD, SAMASTIPUR

MID - TERM EXAMINATION – 2018

Time- 3Hrs.
F. M. - 80

Class – X
Subject - Maths

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 30 questions divided into 4 Sections, A, B, C and D.

(iii) Section-A comprises of 6 questions of 1 mark each. Section-B comprises of 6 questions of 2 marks each. Section-C comprises of 10 questions of 3 marks each and Section-D comprises of 8 questions of 4 marks each.

(iv) Use of calculator is not permitted.

SECTION–A

1. In ΔABC and ΔDEF, $\frac{AB}{DE} = \frac{BC}{FD}$, are they similar?

2. If $\sin\theta = \frac{1}{3}$, then find the value of $(2\cot^2\theta + 2)$

3. A bag contains 3 red balls, 5 white balls and 7 black balls. What is the probability that a ball drawn from the bag at random will be neither red nor black? OR, If $a_n = 3+4n$, find 10th term.

4. What is the solution of the pair of equation $y = 0$ and $y = -3$?

5. Which measure of central tendency is given by the x-coordinate of the point of intersection of the 'more than ogive' and 'less than ogive'?

6. Give an example of polynomials $f(x)$, $g(x)$, $q(x)$ and $r(x)$ satisfying $f(x) = g(x).q(x) + r(x)$, where degree of $r(x) = 0$.

SECTION–B

7. P and Q are the points on the sides DE and DF of a triangle DEF such that $DP = 5$ cm, $DE = 15$ cm, $DQ = 6$ cm and $QF = 18$ cm. Is $PQ \parallel EF$? Give reasons for your answer.

8. If $\sin^2 A = 2\sin A$ then find the value of A. OR

Draw a ΔABC with side $BC = 6$ cm, $AB = 5$ cm, $\angle ABC = 60°$. Then construct a Δ whose sides are $\frac{3}{4}$ of the corresponding sides of the ΔABC. Also write steps of construction.

P.T.O.

9. Construct the cumulative frequency distribution of the following distribution:

Class	10–20	20–30	30–40	40–50	50–60
Frequency	2	22	18	15	13

10. Find the relation between a and b if $x = 2, y = 3$ is a solution of a pair of equations $2x - 3y + a = 0$ and $2x + 3y - b + 2 = 0$.

11. Write the quadratic polynomial, sum of whose zeros is $2\sqrt{3}$ and their product is 2.

12. Solve for x, $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$ $(x \neq 2, 4)$

SECTION–C

13. Prove that $\sqrt{2}$ is an irrational number.

14. Use Euclid's Division Lemma to show that the square of any positive integer is either of the form $3m$ or $3m + 1$ for some integer m.

15. Solve the following system of equations for x and y:

$$(a - b)x + (a + b)y = a^2 - 2ab - b^2$$

$$(a + b)(x + y) = a^2 + b^2$$

16. Represent the following system of linear equations graphically. From the graph, find the points where the lines intersect y–axis.

$$3x + y - 6 = 0$$

$$2x - y - 5 = 0$$

17. Prove that $(\sin\theta + \text{cosec}\,\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$.

18. In Fig. 1, $DB \perp BC$, $DE \perp AB$ and $AC \perp BC$. Prove that $\frac{BE}{DE} = \frac{AC}{BC}$

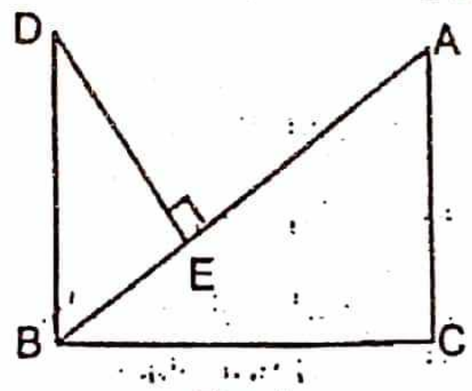

Fig. 1

19. Check whether the polynomial $g(x)$ is factor of $p(x)$ where

$$g(x) = x^2 + 3x + 1$$

$$p(x) = 3x^4 + 5x^3 - 7x^2 + 2x + 2.$$

20. An aircraft has 120 passenger seats. The number of seats occupied during 100 flights is given in the following table:

Number of seats	100–104	104–108	108–112	112–116	116–120
Frequency	15	20	32	18	15

Determine the mean number of seats occupied over the flights.

21. Two numbers are in the ratio 5 : 6. If 8 is subtracted from each of the numbers the ratio becomes 4 : 5. Find the numbers.

OR

Solve by quadratic formula $a^2b^2x^2 - (4b^4 - 3a^4)x - 12a^2b^2 = 0$

P. T. O.

22. Using Euclid's division algorithm, find the HCF of 56, 96 and 404.

SECTION–D

23. Find k so that $x^2 + 2x + k$ is a factor of $2x^4 + x^3 - 14x^2 + 5x + 6$. Also find all the zeros of the two polynomial.

24. A survey regarding the heights (in cm) of 50 girls of class X of a school was conducted and the following data was obtained.

Height in cm	120–130	130–140	140–150	150–160	160–170	Total
Number of girls	2	8	12	20	8	50

Find the mean, median and mode.

25. Prove that the ratio of the areas of two similar triangle is equal to the ratio of squares of their corresponding sides.

26. Prove that: $\dfrac{\cot A - \cos A}{\cot A + \cos A} = \dfrac{\text{cosec } A - 1}{\text{cosec } A + 1}$

27. In the Fig. 2, given below, OB is the perpendicular bisector of the line segment DE, $FA \perp OB$ and FE intersects OB at the point C. Prove that $\dfrac{1}{OA} + \dfrac{1}{OB} = \dfrac{2}{OC}$.

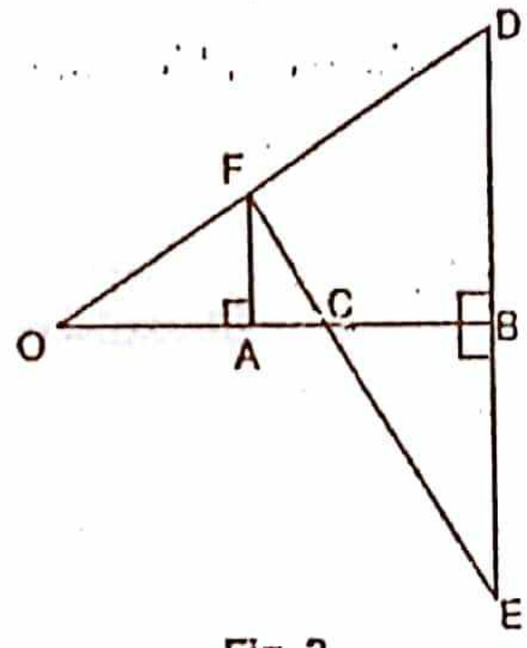

Fig. 2

28. It can take 12 hours to fill a swimming pool using two pipes. If the pipe of larger diameter is used for 4 hours and the pipe of smaller diameter for 9 hours, only half the pool can be filled. How long would it take for each pipe to fill the pool separately?

29. If $\text{cosec } \theta + \cot \theta = p$, then prove that $\cos \theta = \dfrac{p^2 - 1}{p^2 + 1}$.

30. The annual rainfall record of a city for 66 days is given in the following table.

Rainfall in cm	0–10	10–20	20–30	30–40	40–50	50–60
Number of days	22	10	8	15	5	6

Calculate the median rainfall using ogives (of more than type and of less than type).

OR

if the sum of the first n terms of an AP is $4n - n^2$, what is the first term (that is S_1)? What is the sum of the first two terms? What is the 2nd term? similarly find the 3rd, 10th and nth terms.