LIONS SCHOOL MIRZAPUR

HALF YEARLY EXAMINATION 2020-21

Class: XI Time: 3hrs

Subject: Mathematics MM: 80

General Instructions: - 1. Attempt all the questions.

2. this question paper consists of 36 questions. Divided into four sections A,B,C and D. Section A comprises of 20 questions of **one** mark each, Section B comprises of 6 questions of **two** mark each, Section C comprises of six questions of **four** marks each and Section D comprises of four questions of **six** mark each.

3. There is no overall choice, however internal choice has been provided in two questions of each section.

4. Use of calculators is not permitted.

SECTION – A

Choose and write correct option in following questions. (1x10=10)

Q1. Total number of subsets of a set having n elements is

a). n^2

b). 2^n

c). infinite

d). None of these

Q2. If set A contains 'm' elements and set B contains 'n' elements then total number of relations from A to B is

a). 2^{mn}

b). $(mn)^2$

c). m.n

d). Non of these

Q3. If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$, then x = ?

a). 32

b). 48

c). 64

d). None of these

Q4. If ${}^{n}c_{18} = {}^{n}c_{12}$, then the value of ${}^{32}c_{n}$ = ?

a). 248

b). 496

c). 992

d). None of these

Q5. If R = {(x,y): x,y∈Z, $x^2 + y^2 \leq 4$} is a relation on Z, then domain of R is

a). {0,1,2}

b). {0, -1, -2}

c). {-2, -1,0,1,2}

d). None of these.

Q6. If nth term of an AP is $a_n = 2n - 5$. Then its common difference is

a). 2

b). 3

c). 4

d). Cannot be determined.

Q7. The value of $(2\pi / 15)$ radians in degrees is given by

a). 24

b). 32

c). 28

d). None of these

Q8. The value of $\sin 78^0 \cos 18^0 - \cos 78^0 \sin 18^0$ is

a). $\frac{\sqrt{3}}{2}$

b). $2/\sqrt{3}$

c). 2

d). None of these

Q9. The value of $\sin 75^0$ is equal to

a). $\sin 15^0$

b). $\cos 15^0$

c). $\sin 75^0$

d). None of these

Q10. The slope of line passing through the points (3,-5) and (1,2) is

a). -7/3

b). -7/2

c). 135^0

d). None of these

Fill in the blanks from 11 to 15. (1x5=5)

Q11. The collection of well-defined objects is called a……

Q12. If A = {-3,3} and B = {x: $x^2 - 9 = 0$, $x \in Z$} then A and B are ……. Sets.

Q13. The angle between the lines $2x - y + 3 = 0$ and $x + 2y + 3 = 0$ is …….

Q14. If A = {1,2,3,4,5,6,9} and B = {2,3,5,8,10} then $A \cap B$ = ……..

Q15. If Z = 1/(2+i) . Then $|Z|$= ……

Very short answer type questions from 16 to 20. (1x5=5)

Q16. Solve inequation $-6x < 30$ where $x \in Z$.

Q17. Write Arg (Z) if Z = $(1 - i\sqrt{3})$.

Q18. If $Y = x + x^2 + x^3 + \ldots\ldots\infty$, where $|x| < 1$, prove that x = y/(1+y).

OR

If an infinite GP, first term is equal to ten times the sum of all successive terms, then fined its common ratio.

Q19. If 'a' is GM of 2 and ¼ find a.

Q20. Which term of AP 3,8,13,……..is 248?

OR

Find tenth term of G.P. 0.3,0.06,0.012,…….

SECTION – B

Question Nos. 21 to 26 carry two marks each.

Q21. Express Z = $\frac{4+5i}{5-4i}$ in a+ib form.

OR

Solve quadratic equation $x^2 + x + 1 = 0$. For x.

Q22. If ${}^{11}P_r = {}^{12}P_{r-1}$, find r.

OR

How many triangles can be formed by joining the vertices of a hexagon?

Q23. If $x + iy = \frac{a+ib}{a-ib}$, prove that $x^2 + y^2 = 1$.

Q24. Sum of three numbers in A.P. is 24 and their product is 440. Find the numbers.

Q25. Find the value of $8\cos^3(\pi/9) - 6\cos(\pi/9)$.

Q26. Reduce the equation $\sqrt{3}\,x + y + 2 = 0$ slope intercept form and write the value of slope and Y- intercept.

SECTION – C

Q27. Find the image of the point (2,3) in the mirror line 3x – y + 4 =0.

Q28. Prove that $\frac{sinx}{cos3x} + \frac{sin3x}{cos9x} + \frac{sin9x}{cos27x} = \frac{1}{2}(\tan 27x - \tan x)$.

Q29. Find the equations of the straight lines which pass through the origin and trisect the portion of the straight line 2x + 3y = 6 which is intercepted between the axes.

Q30. How many different words, each containing 2 vowels and 3 consonants can be formed with 5 vowels and 17 consonants?

Q31. How many arrangement can be made with the letter of the word " MATHEMATICS" ? In how many of them vowels are together?

OR

Out of 7 teachers and 5 students, a committee of 9 is to be formed. In how many ways this can be done, if committee contains

(i) Exactly four students
(ii) At least four students

Q32. In a survey of 700 students in a college, 180 were listed as drinking Limca, 275 as drinking Miranda and 95 were listed as drinking Limca as well as Miranda. Find how many students were drinking neither miranda nor limca.

OR

Find the domain and range of function f(x) = $\frac{x^2}{1+x^2}$.

SECTION – D

Q33. Prove that $\cos 20^0 \cos 40^0 \cos 60^0 \cos 80^0 = \frac{1}{16}$.

OR

Prove that $\frac{cos5x+cos4x}{1-2cos3x}$ = - (cos2x + cosx)

Q34. If the 5th and 12th terms of an A.P. are 30 and 65 respectively, what is the sum first 20 terms?

Q35. Solve the following system of equations graphically

$2x + y \leq 100$, $x + 2y \leq 80$, $x + y \leq 60$, $x \geq 0$, $y \geq 0$.

Q36. Find the sum of the following series: 0.5 + 0.55 +0.555 +……to n terms.

OR

The sum of two numbers is 6 times their geometric mean, show that the numbers are in the ratio $(3+2\sqrt{2}) : (3-2\sqrt{2})$.