Meghalaya Board of School Education

SAMPLE PAPERS

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MATHEMATICS

Full Marks : 80

Time : 3 hours

General Instructions :

1. All questions are compulsory.

2. The question paper consists of 36 questions divided into four Sections A, B, C and D.

   Section A consists of 20 questions of 1 mark each.

   Section B consists of 6 questions of 2 marks each.

   Section C consists of 6 questions of 4 marks each.

   Section D consists of 4 questions of 6 marks each.

3. There is no overall choice. However there will be internal choices for 4 marks questions and 6 marks questions.

4. Use of calculator is not permitted.

SECTION – A

1. If R is the set of real numbers and Q is the set of rational numbers, then what is R – Q? 1

2. Write the power set of A = {1, 2, 3}. 1

3. If $\left(\frac{x}{3}+1, y-\frac{2}{3}\right)=\left(\frac{5}{3}, \frac{1}{3}\right)$, find the values of x and y. 1

4. Find the degree measure corresponding to the radian measure : $\frac{11}{16}$. $\left[\text{use } \pi=\frac{22}{7}\right]$. 1

5. Find the value of cos (–1410°). 1

6. Express the complex number i^{19} in the form $(a+ib)$. 1

7. Solve the equation $x^2+3x+9=0$. 1

8. Solve : $24x<100$, when x is an integer. 1

9. Write the first five terms of the sequence whose n^{th} term is $a_n=\frac{2n-3}{6}$. 1

10. If $\frac{2}{7}$, x, $\frac{7}{2}$ are in Geometric Progression, find the value of x. 1

11. Find the equation of the line through (–2, 3) with slope – 4. 1

12. Find the equation of the line through the points (3, –2) and (–1, 4). 1

13. Find the intercepts cutoff by the straight line $3x + 2y = 6$ from the co-ordinate axes. 1

14. Find the equation of the circle with centre $\left(\frac{1}{2}, \frac{1}{4}\right)$ and radius $\frac{1}{12}$. 1

15. Evaluate : $\lim_{x \to 0}\left(\frac{\sin ax}{\sin bx}\right)$; a, b $\neq 0$. 1

16. Evaluate : $\lim_{x \to 0}\left\{\frac{(x+1)^5 - 1}{x}\right\}$. 1

17. Write down the sample space when a coin is tossed three times. 1

18. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will be a diamond. 1

19. Find the number of words that could be formed with the letters of the word "COLLEGE". 1

20. If $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$, find x. 1

SECTION – B

21. Find the value of tan 15°. 2

22. Find the multiplicative inverse of $\left(\sqrt{5} + 3i\right)$. 2

23. Find r, if $5\,{}^{4}\mathrm{P}_{r} = 6\,{}^{5}\mathrm{P}_{r-1}$. 2

24. Find the Co-efficient of x^5 in $(x+3)^8$. 2

25. Using binomial theorem, evaluate $(99)^5$. 2

26. Find the derivative of $\frac{1}{x^2}$. 2

SECTION – C

27. The relation f is defined by

$$f(x) = \begin{cases} x^2, 0 \le x \le 3 \\ 3x, 3 \le x \le 10 \end{cases}$$

The relation g is defined by

$$g(x) = \begin{cases} x^2, 0 \le x \le 2 \\ 3x, 2 \le x \le 10 \end{cases}$$

Show that f is a function and g is not a function. 4

28. Solve the following system of inequalities graphically:

$x + 2y \le 10$, $x + y \ge 1$, $x - y \le 0$, $x \ge 0$, $y \ge 0$. 4

29. Find the co-ordinates of the foci, the vertices, the eccentricity and the length of the latus rectum of the hyperbola $49y^2 - 16x^2 = 784$. 4

Or

Find the equation of the ellipse whose major axis on the x–axis and passes through the points (4, 3) and (6, 2).

30. Find the co-ordinates of the points which trisect the line segment joining the points P(4,2, – 6) and Q(10, –16, 6). 4

Or

If the origin is the centroid of the triangle PQR with vertices P($2a$, 2, 6), Q(– 4,$3b$, –10) and R(8, 14, $2c$), then find the values of a, b and c.

31. Find the derivative from first principle of sin x 4

Or

Find the derivatives of

(i) $\frac{2}{(x+1)}$ (ii) log sin x

32. In class XI of a school 40% of the students study Mathematics and 30% study Biology. 10% of the class study both Mathematics and Biology. If a student is selected at random from the class, find the probability that he will be studying Mathematics or Biology. 4

Or

Three coins are tossed once. Find the probability of getting (i) 3 heads (ii) at least 2 heads.

SECTION – D

33. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports. 6

34. The ratio of the A.M. and G.M. of two positive numbers a and b is $m : n$.

Show that $a : b = \left(m + \sqrt{m^2 - n^2}\right) : \left(m - \sqrt{m^2 - n^2}\right)$. 6

Or

Insert five numbers between 8 and 26 such that the resulting sequence is an A.P.

35. Prove that 6

(i) $\cot 4x\,(\sin 5x + \sin 3x) = \cot x\,(\sin 5x - \sin 3x)$

(ii) $\tan 4x = \dfrac{4\tan x\,(1 - \tan^2 x)}{1 - 6\tan^2 x + \tan^4 x}$

36. Find the mean deviation about the mean for the following data: 6

Marks obtained	10–20	20–30	30–40	40–50	50–60	60–70	70-80
Number of Students	2	3	8	14	8	3	2

Or

Find the mean deviation about the median for the following data:

Marks	0–10	10–20	20–30	30–40	40–50	50–60
Number of girls	6	8	14	16	4	2

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Sample Papers

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