



ཤེས་རིག་ལྟན་ལག་།
 ལུ་ཏིག་ཐང་འབྲིང་རིམ་སློབ་གྲྭ་གོང་མ།



**MOTITHANG HIGHER SECONDARY SCHOOL
 THIMPHU THROMDE**

“Every child is **inspired** to learn and **empowered** with **wisdom** to excel in life”

Mid-Term: 2019

XI science Mathematics

Writing Time: 3hour

Date:

Full marks: 100

Name: Class & Sec. Roll No.:

Invigilator's initial

| Questions | For Teacher's Use Only | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|------------------------|-----------|---|----|---|----|---|----|---|----|---|----|---|----|---|----|---|-----|---|-----|---|-----|---|-----|---|-----|---|--|--|
| | Section A Q1 | Section B | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Q2 | | Q3 | | Q4 | | Q5 | | Q6 | | Q7 | | Q8 | | Q9 | | Q10 | | Q11 | | Q12 | | Q13 | | Q14 | | | |
| Marks | 30 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | | |
| Award | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Teacher's initial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Marks Awarded | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Grand total

SECTION A

(Answer ALL questions)

Directions: Read the following questions carefully. For each question there are four alternatives A, B, C and D. Choose the correct alternative and write it in your answer sheet.

Question 1

(15x 2 = 30)

i) Sum of 20 terms of 1,3,5,7,9 is

A) 400 B) 450 C) 350 D) 300

A) I B) II C) III D) IV

ii) If ${}^nC_8 = {}^nC_6$ the value of n_{C_2} is

A) 90 B) 92 C) 91 D) 93

iii) When $f(x) = 2x^2 - 5x + 7$ is divided by $(x - 1)$. Then remainder is

A) 5 B) -5 C) 4 D) -4

iv) The roots of $2x^2 + x - 3$ are

A) $1, \frac{3}{2}$ B) $1, -\frac{3}{2}$ C) $\frac{1}{2}, 1$ D) 1, 2

v) The length of a pendulum is 9m. while it swings through 1.5rad, the length of the arc through which the tip of the pendulum passes is

A) 12 B) 12.5 C) 13 D) 13.5

vi) The angle -1081° lies in quadrant

A) I B) II C) III D) IV

vii) The value of $\log_4 256$ is

A) 3 B) 0 C) 4 D) 1

viii) The fourth term of $(3x - y)^4$ is

A) $12xy^3$ B) $-12xy^3$ C) $12xy^2$ D) $-12xy^2$

ix) The area of a sector of a circle with radius 5m bounded by an arc of length 8m is

A) $18m^2$ B) $17m^2$ C) $20m^2$ D) $16m^2$

x) The value of $3^{\log_3 7}$

- A) 3 B) 5 C) 7 D) 2

xi) Which of the following is NOT an example of proper fraction

- A) $\frac{x^2+2x+4}{(x-1)(x-2)}$ B) $\frac{5x-7}{x^2+5x+6}$ C) $\frac{5x-2}{(x-3)^2}$ D) $\frac{42-19x}{(x^2+1)(x-4)}$

xii) The value of $\sec\theta + \tan\theta$ when θ lies between 0 and $\frac{\pi}{2}$ if $\sin\theta = \frac{21}{29}$ is

- A) 2 B) 2.5 C) -2.5 D) -2

xiii) The value of $\sin^2 30^\circ + \cos^2 30^\circ$

- A) 2 B) -2 C) 1 D) -1

xiv) The value of a, if $x^3 + ax + 2a - 2$ is exactly divisible by $(x + 1)$ is

- A) 2 B) -2 C) 3 D) -3

xv) The nth term of GP is given by

- A) ar^n B) $a + (n - 1)d$ C) $a(n - 1)d$ D) ar^{n-1}

Section – B (70 marks)

Answer any 10 questions

Question 2

- a) The second term of G.P is 18 and the fifth term is 486. Find the first term and the common ratio [3]

b) Find the coefficient of x^{15} in the expansion of $(x - x^2)^{10}$ [4]

Question 3

a) Solve for x

[3]

$$\log_2(\log_9 3) = \log_x 6$$

b) Resolve $\frac{2x^2+7x+23}{(x-1)(x+3)^2}$ into partial fractions.

[4]

Question 4

a) If θ lies in the II quadrant and $\tan \theta = -\frac{5}{12}$. Find the value of $\frac{2 \cos \theta}{1 - \sin \theta}$

[3]

b) Resolve $\frac{3x^2-5x+1}{x^2-2x-3}$ into partial fractions.

[4]

Question 5

a) Simplify.

[3]

i) $\frac{\cos(-\theta)}{\sin(90+\theta)}$

ii) $\frac{\tan(-\theta)}{\sin(540+\theta)}$

b) If $x^3 + ax^2 + bx + 6$ has $(x - 2)$ as a factor and leaves remainder 3 when divided by $(x - 3)$. Find the values of a and b. [4]

Question 6

- a) Find the sum of the series $81 - 27 + 9 \dots \dots - \frac{1}{27}$ [4]

b) Resolve $\frac{7+x}{(1+x)(1+x^2)}$

[3]

Question 7

a) Expand $(3x - 2y)^4$

[3]

b) Solve $x^2 + \frac{5}{2}ix + 1 = 0$

[4]

Question 8

a) Expand $(3 + 2x)^{-5}$ up to four terms in ascending power of x [3]

b) Solve $\frac{x+1}{x-1} - \frac{x-1}{x+1} = \frac{5}{6}$ [4]

Question 9

a) Express the following angles in degrees

$$\frac{\pi}{3} \text{radian}, \frac{\pi}{15} \text{radian}, \frac{7\pi}{90} \text{radian} \quad [3]$$

b) Prove that $\frac{\sin \alpha}{1 + \cos \alpha} + \frac{1 + \cos \alpha}{\sin \alpha} = 2 \operatorname{cosec} \alpha$ [4]

Question 10

a) Factorize $x^3 + 13x^2 + 32x + 20$

[3]

b) If $\log\left(\frac{a+b}{2}\right) = \frac{1}{2}(\log a + \log b)$ show that $a = b$

[4]

Question 11

- a) The area of a sector of a circle is 5.024cm^2 and its radius is radius 36° . Find the radius of the circle $\pi = 3.14$

[3]

- b) Evaluate $\frac{\cos 3\theta - 2 \cos 4\theta}{\sin 3\theta + 2 \sin 4\theta}$ when $\theta = 150$

[4]

Question 12

a) Verify

[4]

i) $\sec^2\theta = 1 + \tan^2\theta$ if $\theta = \frac{\pi}{4}$

ii) $\sin 60^\circ = \frac{2\tan 30^\circ}{1+\tan^2 30^\circ}$

b) The cosecant of an angle is $\frac{13}{5}$. Evaluate the other t-ratios.

[3]

Question 13

a) Prove that

[3]

$$\tan 225^\circ \cot 405^\circ + \tan 765^\circ \cot 675^\circ = 0$$

b) Solve

$$\log_3(3 + x) + \log_3(8 - x) - \log_3(9x - 8) = 2 - \log_3 9 \quad [4]$$

Question 14

- a) The polynomials $ax^3 + 3x^2 - 13$ and $2x^3 - 5x + a$ are divided by $(x + 2)$. If the remainder is same in each case, find the value of a [3]

b) Examine the nature of roots

i) $2x^2 + 2x + 3 = 0$

ii) $2x^2 - 7x + 3 = 0$

[4]