B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

NABET

INDIAN PUBLIC SCHOOLS' CONFERENCE

PRE MID TERM EXAMINATION 2025-26
MATHEMATICS (MARKING SCHEME)

Class: XI B **Time: 1hr**
Date: 04/08/25 **Max Marks: 25**
Admission no: **Roll no:**

General Instructions:
Question 1 to 5 carries ONE mark each. Questions 6 to 9 carries TWO marks each. Questions 10 to 13 carries THREE marks each.

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1. The value of $2[3x7(7-5)-37]$ in binary number system is:
   a) $(1011)_2$ b) $(1001)_2$ **c) $(1010)_2$** d)None of these
2. The sum of $(10111)_2$ and $(1111)_2$ is :
   a) $(111111)_2$ b)$(101111)_2$ **c)$(100110)_2$** d) $(01010101)_2$
3. $(256)^{0.16}$ x $(256)^{0.09}$ is equal to:
   a) **4** b) 16 c) 32 d) 64
4. If $\sqrt{2^n}$ =64, then the value of n is :
   a) 2 b) 4 c) 8 **d) 12**
5. The value of $\log_5\left(\frac{1}{125}\right)$
   a) 1 b) 3 **c) -3** d) 1/3

6. Divide: 101010 by 110.
Sol:

```
          1 1 1
110 ) 1 0 1 1 0 1
    -  1 1 0
       1 0 1 0
      -  1 1 0
         1 0 0 1
        -  1 1 0
             1 1
```

$(101101)_2 \div (110)_2 = (111)_2$

7. Solve for x: $\log_{27} x = \frac{4}{3}$.
Sol:

If $log_a b = c$, then $a^c = b$ *(definition of logarithm)*

$log_{27} x$ = $\frac{4}{3}$ ⇒ $27^{\frac{4}{3}} = x$ ⇔ $(\sqrt[3]{27})^4$ = x

x = 3^4

x = ***81***

8. Find the value of $\log_{0.5} 256$.

Sol:

Since 0.5 is the same as 1/2 or 2^{-1}, we can rewrite the equation as:

$(1/2)^x = 256$

$2^{-x} = 2^8$

Since the bases are the same (both are 2), the exponents must be equal. Therefore:

-x = 8

x = -8

Therefore, $\log_{0.5} 256 = -8$.

9. Solve for x: $\log_{10}(10x + 5) - \log_{10}(x + 4) = \log_{10} 2$.

$$\log_{10}(10x + 5) - \log_{10}(x + 4) = \log_{10} 2$$

$\log\left(\frac{10x+5}{x+4}\right) = \log 2$

$\frac{10x+5}{x+4} = 2$

x= 3/8

10. Find the product of 45 and 107 using binary numbers and check the answers.

Sol:

$45 = (101101)_2$

$107 = (1101011)_2$

Product of 101101x 1101011 = $(1001011001111)_2$ = 4815=45 x107

11. Express as the logarithm of a single number: $\frac{2}{3} log8 - 2\ log3$

Sol:

$\log(2^3)^{2/3} - \log 9 = \log 2^2 - \log 9 = \log 4/9$.

12. If $a^x = b^y = c^z$ and $b^2 = ac$, prove that $y = \frac{2xz}{x+z}$

Sol:

$a^x = b^y = c^z = k$

x= logk/loga , y= logk/logb , z= logk/logc

Now,

$$\frac{2xz}{x+z} = \frac{\frac{2logk}{loga} x \frac{logk}{logc}}{\frac{logk}{loga} + \frac{logk}{logc}} = \frac{2logk}{logb^2} = \text{logk/logb} = y$$

13. Evaluate with the help of logarithm: $\frac{0.9876\ x(16.42)^2}{(4.567)^{1/3}}$.

Sol;

logx= log0.9876 +2log(16.42)-1/3log4.567

$= \bar{1}.9945 + 2(1.2153) - 1/3\ (0.6597)$

= -1+0.9945+2.4306-0.2199= 2.2052

x= antilog (2.2052) = 160.4

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