B.K. BIRLA CENTRE FOR EDUCATION

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

ANNUAL EXAMINATION (2025-26)
MATHEMATICS (SET-1)
ANSWER KEY

Class: XI **Time: 3hrs**
Date:23-02-26 **Max Marks: 80**
Admission no: **Roll no:**

General instructions:
1. The Question paper contains- five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 very short (VSA) - type questions of 2 marks each.
4. Section C has 6 short (SA)- type questions of 3 marks each.
5. Section D has 4 long (LA)- type questions of 5 marks each.
6. Section E has 3 source based/case-based questions of 4 marks each

Q.No	Correct Option
Q1	(a)
Q2	(b)
Q3	(a)
Q4	(a)
Q5	(a)
Q6	(a)
Q7	(c)
Q8	(a)
Q9	(b)
Q10	(c)
Q11	(b)
Q12	(b)
Q13	(a)
Q14	(c)
Q15	(c)
Q16	(b)
Q17	(d)
Q18	(c)
Q19	(b)
Q20	(a)

SECTION B (5 × 2 = 10 MARKS)

Q21
Given

$$U = \{1,2,3,4,5,6,7,8,9\}$$
$$A = \{1,2,3,4\},\ B = \{2,4,6,8\},\ C = \{3,4,5,6\}$$

(i)

$$A \cup B = \{1,2,3,4,6,8\}$$
$$(A \cup B)' = \{5,7,9\}$$

Marks:
Correct union & complement – **1 mark**

(ii)

$$B - C = \{2,8\}$$
$$(B - C)' = \{1,3,4,5,6,7,9\}$$

Marks:
Correct difference & complement – **1 mark**

Q22
Given

$$\frac{x + iy}{1 + i} = (5\bar{-}\iota) = 5 + i$$

Multiply both sides by $1 + i$:

$$x + iy = (5 + i)(1 + i) = 4 + 6i$$

Comparing real and imaginary parts:

$$x = 4, y = 6$$

Marks:
Multiplication – **1**
Comparison & answer – **1**

Q23
General term:

$$T_{r+1} = \binom{12}{r} x^{12-r} \left(-\frac{1}{3x^2} \right)^r$$

Power of x:

$$12 - r - 2r = 0 \Rightarrow r = 4$$

Independent term:

$$\binom{12}{4} \left(\frac{1}{3}\right)^4$$

Marks:
Finding r – **1**
Independent term – **1**

Q24
Factors of 6: 1,2,3,6
Mean:

$$\bar{x} = \frac{1 + 2 + 3 + 6}{4} = 3$$

Variance:

$$\sigma^2 = \frac{(1-3)^2 + (2-3)^2 + (3-3)^2 + (6-3)^2}{4} = 3.5$$

Marks:
Mean – **1**

Variance – **1**
OR

$$\sigma^2 = \frac{\sum x^2}{n} - \bar{x}^2 \Rightarrow \sum x^2 = 20400$$

Marks:
Formula & substitution – **2**

Q25
Greatest Integer Function:

$$f(x) = \lfloor x \rfloor$$
$$[-1.9] = -2, [1.2] = 1$$

Marks:
Definition & graph – **1**
Values – **1**
OR
Domain = $\mathbb{N}$
Codomain = $\mathbb{N}$
Range = {2,4,6, ... }
Relation is a **function**
Marks:
Domain/Range – **1**
Conclusion – **1**

SECTION C (6 × 3 = 18 MARKS)

Q26
Given:

$$A \cup B = A \cap B$$

Take $x \in A \Rightarrow x \in B$
Similarly, $x \in B \Rightarrow x \in A$

$$\Rightarrow A = B$$

Marks:
Logic – **2**
Conclusion – **1**

Q27

$$\frac{7x-1}{2} < -3 \Rightarrow x < -5$$
$$\frac{3x+8}{5} + 11 < 0 \Rightarrow x < -21$$

Final solution:

$$x < -21$$

Marks:
First inequality – **1**
Second inequality – **1**
Final answer & graph – **1**
OR
Acid quantity formed, inequality solved.
Marks:
Formulation – **1**
Solution – **2**

Q28
For hyperbola:

$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

Using given focus and point, equation obtained.
Marks:
Standard form – **1**
Substitution – **1**
Final equation – **1**
OR
Ellipse:

$$a = \frac{9}{4},\ e = \frac{1}{\sqrt{3}} \Rightarrow b^2 = \frac{27}{16}$$

Marks:
Finding parameters – **2**
Equation – **1**

Q29

$$f(x) = \frac{1}{\sqrt{x + |\ x\ |}}$$

For$x > 0$: $x + |\ x\ | = 2x > 0$

Domain: $(0, \infty)$

Marks:
Case analysis – **1**
Domain – **2**

Q30

$$\frac{a+b}{2\sqrt{ab}} = 2 \Rightarrow \frac{a}{b} + \frac{b}{a} = 14$$
$$a : b = 7 : 1$$

Marks:
Equation – **2**
Ratio – **1**

Q31
Given $\tan x = -\frac{4}{3},\ x \in QII$
Using triangle and half-angle formulae:

$$\sin\frac{x}{2}, \cos\frac{x}{2}, \tan\frac{x}{2}$$

Marks:
Triangle – **1**
Formula – **1**
Answer – **1**

SECTION D (4 × 5 = 20 MARKS)

Q32
Table values (any 5 correct) – **2**
Correct sine graph – **2**
Max = 1, Min = –1 – **1**

Q33
GP: 32,16, … ,1

$$32\left(\frac{1}{2}\right)^{n-1} = 1 \Rightarrow n = 6$$
$$S = 63$$

Marks:
Pattern – **1**
Terms – **2**
Sum – **2**

Q34
Using first principle:

$$\frac{d}{dx}(x\sin x) = \sin x + x\cos x$$

Marks:
Definition – **1**
Limit steps – **2**
Result – **2**

Q35
Mean:

$$\sum x = 56$$

Variance:

$$\sum x^2 = 560$$

Remaining numbers: **6 and 8**
Marks:
Equations – **3**
Solution – **2**

SECTION E (3 × 4 = 12 MARKS)

Q36
Selection:

$$\binom{4}{2}\binom{5}{2} = 60$$

Arrangement:

$$2! \times 3! = 12$$

Marks:
Selection – **2**
Arrangement – **2**

Q37
Slope:

$$m = \frac{4}{3}$$

Angle between lines = 0°
Distance:

$$\frac{|\,6 + 9\,|}{\sqrt{4^2 + (-3)^2}} = 3$$

Marks:

Slope – **1**
Angle – **1**
Distance – **2**

Q38

$$P(A') = 0.95,\ P(B') = 0.90$$

(i) $P(\text{neither}) = 0.87$– **1**
(ii) $P(\text{at least one}) = 0.13$– **1**
(iii) $P(\text{exactly one}) = 0.11$– **2**

**********BEST OF LUCK**********