Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/BBA(H), BIRM, BSCM/SEM-1/BBA-102/2012-13

2012

MATHEMATICS-I

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
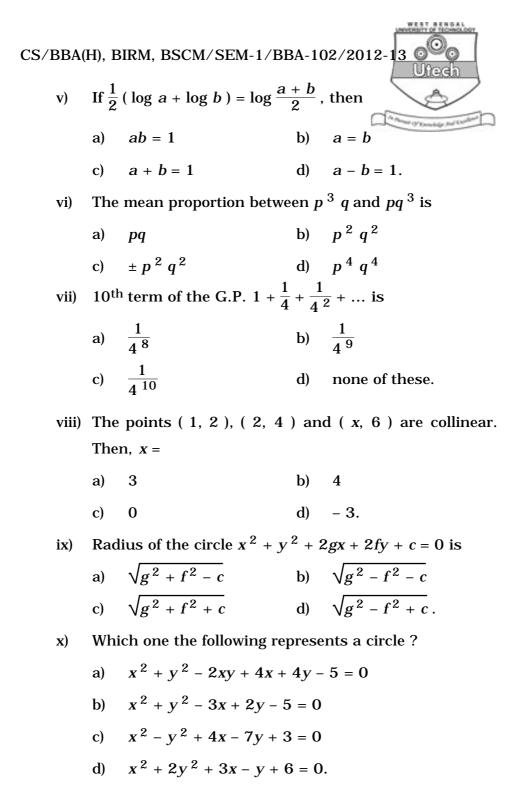as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

$10 \times 1 = 10$

i) The value of $\log_{\frac{1}{2}} 64$ is

a) 6   b) -6

c) $\frac{1}{6}$ d) $-\frac{1}{6}$.

ii) The term containing x^8 in $(1 + x^2)^{10}$ is

a) 5th   b) 4th

c) 6th   d) 7th.

iii) Slope of the line parallel to the line joining the points
(2, 5) and (– 4, 3) is

a) – 3   b) 3

c) 1/3   d) – 1/3.

iv) $\left(\sqrt{2+1}\right)^6 + \left(\sqrt{2-1}\right)^6 =$

a) 180   b) 90

c) 198   d) 99.

1056   [Turn over

v)   If $\frac{1}{2}$ (log a + log b) = log $\frac{a + b}{2}$, then

a) $ab = 1$ b) $a = b$

c) $a + b = 1$ d) $a - b = 1$.

vi) The mean proportion between $p^3 q$ and pq^3 is

a) pq b) $p^2 q^2$

c) $\pm p^2 q^2$ d) $p^4 q^4$

vii) 10th term of the G.P. $1 + \frac{1}{4} + \frac{1}{4^2} + ...$ is

a) $\frac{1}{4^8}$ b) $\frac{1}{4^9}$

c) $\frac{1}{4^{10}}$ d)   none of these.

viii) The points (1, 2), (2, 4) and (x, 6) are collinear.
     Then, $x =$

a)   3   b)   4

c)   0   d) -3.

ix) Radius of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is

a) $\sqrt{g^2 + f^2 - c}$ b) $\sqrt{g^2 - f^2 - c}$

c) $\sqrt{g^2 + f^2 + c}$ d) $\sqrt{g^2 - f^2 + c}$.

x)   Which one the following represents a circle ?

a) $x^2 + y^2 - 2xy + 4x + 4y - 5 = 0$

b) $x^2 + y^2 - 3x + 2y - 5 = 0$

c) $x^2 - y^2 + 4x - 7y + 3 = 0$

d) $x^2 + 2y^2 + 3x - y + 6 = 0$.

xi) If $f(x) = \dfrac{|x|}{x}$, then for any $\lambda > 0$, $|f(\lambda) - f(-\lambda)| =$

a) 1

b) 2

c) – 1

d) 0.

GROUP – B
(Short Answer Type Questions)
Answer any *three* of the following. $3 \times 5 = 15$

2. If $a = xy^{p-1}$, $b = xy^{q-1}$, $c = xy^{r-1}$ then prove that $a^{q-r}.b^{r-p}.c^{p-q} = 1$.

3. A straight line passes through the point (2, 3) and the sum of its intercepts on X axis and Y axis is 10. Prove that the equation of the straight line is $x + y = 5$.

4. If the coefficeint of x^3 in the expansion of $\left(x^2 + \dfrac{k}{x} \right)^6$ be 160, find the value of k.

5. In how many ways can the letters of the word "BALLOON" be arranged, so that two O's do not come together ?

6. Winthout using Venn Diagram prove

$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following. $3 \times 15 = 45$

7. a) If α and β are two non-zero roots of $x^2 + px + q = 0$, find the equation whose roots are $\dfrac{1}{\alpha + \beta}$ and $\dfrac{1}{\alpha} + \dfrac{1}{\beta}$.

b) Find the equation of the straight line which passes through the point of intersection of the lines $x - y + 1 = 0$, $3x + y - 5 = 0$ and is parallel to the line $7x - 8y + 13 = 0$.

c) In a class of 50 students, 15 read Physics, 20 read Chemistry and 20 read Mathematics, 3 read Physics and Chemistry, 6 read Chemistry and Mathematics and 5 read Physics and Mathematics and 7 read none of the subject. How many students read all the subjects ?

5 + 5 + 5

8. a) Divide 21 into three parts, which will be in A.P., such that the product of the first and second parts is 28.

b) If $f(x) = \dfrac{1-x}{1+x}$ find $f\left\{ f\left(\dfrac{1}{x}\right)\right\}$.

c) Show that $2 + \sqrt{17}$ is not a rational number. 5 + 5 + 5

9. a) In a G.P. p-th, q-th and r-th terms are respectively a, b, c. Show that $a^{q-r} b^{r-p} c^{p-q} = 1$.

b) If $x^2 + y^2 = 14xy$, prove that $2 \log \dfrac{x+y}{4} = \log x + \log y$.

c) If $\dfrac{x}{y+z} = \dfrac{y}{z+x} = \dfrac{z}{x+y}$, then show that $x + y + z = 0$ or each fraction $= \dfrac{1}{2}$. 5 + 5 + 5

10. a) What is the present value of Rs. 1000 due in 2 years at 5% compounded interest according as the interest is paid (i) yearly (ii) half-yearly.

b) Apply the principle of mathematical induction to prove

$$\dfrac{1}{4.7} + \dfrac{1}{7.10} + \dfrac{1}{10.13} + \cdots + \dfrac{1}{(3n+1).(3n+4)} = \dfrac{n}{4(3n+4)}$$

c) Solve : $2^{x+2} + 2^{x-1} = 9$. 5 + 5 + 5

11. a) Find the locus of the point, the ratio of whose distances from the line $x = 2$ and from the point $(5, -1)$ is $3 : 2$.

b) State De Morgan's laws.
If $U = \{ -1, -2, 0, 3, 5, 10, 12, 13, 16 \}$, $P = \{ -2, 3, 5, 12 \}$, $Q = \{ -1, -2, 0, 5, 12, 13 \}$, then verify De Morgan's Laws.

c) Find the equation of the circle through the points $(4, 3)$ and $(-2, 5)$ and having its centre on the line $2x - 3y = 4$.

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