

Invigilator's Signature :

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

## 2012 <br> 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 $\left(1+x^{2}\right)^{10}$ is
a) 5th
b) 4 th
c) 6 th
d) 7 th.
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) $(\sqrt{2+1})^{6}+(\sqrt{2-1})^{6}=$
a) 180
b) 90
c) 198
d) 99 .

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

a) $a b=1$
b) $\quad a=b$
c) $a+b=1$
d) $a-b=1$.
vi) The mean proportion between $p^{3} q$ and $p q^{3}$ is
a) $p q$
b) $p^{2} q^{2}$
c) $\pm p^{2} q^{2}$
d) $p^{4} q^{4}$
vii) $10^{\text {th }}$ term of the G.P. $1+\frac{1}{4}+\frac{1}{4^{2}}+\ldots$ 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 $x^{2}+y^{2}+2 g x+2 f y+c=0$ is
a) $\sqrt{g^{2}+f^{2}-c}$
b) $\sqrt{g^{2}-f^{2}-c}$
c) $\sqrt{g^{2}+f^{2}+c}$
d) $\sqrt{g^{2}-f^{2}+c}$.
$\mathrm{x}) \quad$ Which one the following represents a circle ?
a) $x^{2}+y^{2}-2 x y+4 x+4 y-5=0$
b) $x^{2}+y^{2}-3 x+2 y-5=0$
c) $x^{2}-y^{2}+4 x-7 y+3=0$
d) $x^{2}+2 y^{2}+3 x-y+6=0$.
xi) If $f(x)=\frac{|x|}{x}$, 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 $a=x y^{p-1}, b=x y^{q-1}, c=x y^{r-1}$ then prove that $a^{q-r} . b^{r-p} . c c^{p-q}=1$.
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 $\left(x^{2}+\frac{k}{x}\right)^{6}$ 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 $\alpha$ and $\beta$ are two non-zero roots of $x^{2}+p x+q=0$, find the equation whose roots are $\frac{1}{\alpha+\beta}$ and $\frac{1}{\alpha}+\frac{1}{\beta}$.
b) Find the equation of the straight line which passes through the point of intersection of the lines $x-y+1=0,3 x+y-5=0$ and is parallel to the line $7 x-8 y+13=0$.

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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 Mathèmaties 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 $f(x)=\frac{1-x}{1+x}$ find $f\left\{f\left(\frac{1}{x}\right)\right\}$.
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 $x^{2}+y^{2}=14 x y$, prove that $2 \log \frac{x+y}{4}=\log x+\log y$.
c) If $\frac{x}{y+z}=\frac{y}{z+x}=\frac{z}{x+y}$, then show that $x+y+z=0$ or each fraction $=\frac{1}{2} . \quad 5+5+5$
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
$\frac{1}{4.7}+\frac{1}{7.10}+\frac{1}{10.13}+\ldots+\frac{1}{(3 n+1) .(3 n+4)}=\frac{n}{4(3 n+4)}$
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 $U=\{-1,-2,0,3,5,10,12,13,16\}$, $P=\{-2,3,5,12\}, G=\{-1,-2,0,5,12,13\}$, 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 $2 x-3 y=4$.

