

CS/BBA (H)/BIRM/BSCM/Odd/SEM-1st/ BBA-102/2014-15

BBA-102

MATHEMATICS-I

Time Allotted: 3 Hours

Full Marks: 70

The questions are of equal value.

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. Answer any *ten* questions.

10×1 = 10

(i) The value of $\log_3 27$ is

(A) 5

(B) 3

(C) 4

(D) 2

(ii) If A and B are any two sets then $A \cap (A \cup B)^c =$

(A) ϕ

(B) B^c

(C) A^c

(D) B

(iii) The sum of the binomial coefficients $C_0 + C_1 + C_2 + \dots + C_n$ is

(A) 2

(B) 2^n

(C) 2^{n-1}

(D) none of these

(iv) The value of x for which the equation $2^x = 3^{-x}$ is satisfied is

(A) 1

(B) 0

(C) -1

(D) none of these

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- (v) The value of $\log_b a \times \log_c b \times \log_a c$ is equal to
(A) 1 (B) 0
(C) 2 (D) none of these
- (vi) If $f(x) = x^2 - 2x + 2$ is an
(A) even function (B) odd function
(C) both (A) and (B) (D) neither (A) nor (B)
- (vii) If α and β are the roots of the equation $x^2 - 2x + 1 = 0$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is
(A) -2 (B) 0
(C) 1 (D) 2
- (viii) Angle made by the straight line $y = x$ with x -axis is
(A) 30° (B) 45°
(C) 60° (D) 90°
- (ix) In how much time will Rs 3000 amount to Rs 3993 at 40% p.a. compounded quarterly?
(A) 8 months (B) 6 months
(C) 9 months (D) 11 months
- (x) Centre and radius of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is
(A) (g, f) and $\sqrt{g^2 + f^2 + c}$ (B) $(-g, -f)$ and $\sqrt{g^2 + f^2 - c}$
(C) $(-g, -f)$ and $\sqrt{g^2 + f^2 + c}$ (D) (g, f) and $\sqrt{g^2 + f^2 - c}$
- (xi) $(a + b)^5$ contains
(A) 5 terms (B) 6 terms
(C) 4 terms (D) 7 terms

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.

3×5 = 15

2. In a class of 100 students, 45 students read physics, 52 students read chemistry and 17 students read both the subjects. Find the no. of students who study neither physics nor chemistry.
3. If $x \propto y$ and $y \propto z$ then prove that $(x^2 + y^2 + z^2) \propto (x^3 + y^3 + z^3)^{\frac{2}{3}}$.
4. In how many ways can the letters of the word INDIA be arranged?
5. Find the equation of the locus of a point such that the difference of its distances from the points (5, 0) and (-5, 0) is always 5 unit.
6. Find the co-efficient of x^{10} in the expansion of $(x - \frac{2}{x})^{16}$

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.

3×5 = 15

7. (a) If $x = 3 + 2\sqrt{2}$, find the values of $x^3 + \frac{1}{x^3}$ and $x^4 - \frac{1}{x^4}$ 6
- (b) If one root of the equation $x^2 + px + q = 0$ be three times the other root, then show that $2p^2 = 16q$ 4
- (c) Sum and product of three numbers of a G.P. are respectively 52 and 1728. Find the numbers. 5

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8. (a) Find the sum of the series $1 \times 2 + 2 \times 3 + 3 \times 4 + \dots$ upto n terms. 5
- (b) Show that the points $(3, 0)$, $(6, 4)$ and $(-1, 3)$ are the vertices of a right-angled isosceles triangle. 5
- (c) Find the angle between the straight lines $x - 2y + 1 = 0$ and $x + 3y = 2$ 5
9. (a) Find the equation of the circle concentric to $x^2 + y^2 - 4x + 6y - 13 = 0$ and passing through the point $(-4, 5)$ 6
- (b) Show that the circle $x^2 + y^2 - 6x - 8y + 23 = 0$ does not touch the straight line $4x - 7y + 28 = 0$ 6
- (c) Find the square root of $(18 + 12\sqrt{3})$ 3
- 10.(a) The expenses of a boarding house are partly fixed (house rent, establishment, etc) and partly variable with the number of boarders (expenses for daily food, etc.). The expenses are Rs 70 per head when there are 25 boarders and Rs 60 per head when there are 50 boarders. Find the expenses per head when there are 100 boarders. 5
- (b) How many ways can the letters of the word VOWEL be arranged? 5
- (i) How many of these begin with V
- (ii) How many begin with V and do not end with L?
- (c) A man can buy a flat for Rs 1,00,000 cash or for Rs 50,000 down and Rs 60,000 at the end of the year, if money is worth 10% per year compounds half yearly. Which plan should be chosen? 5
- 11.(a) $a^x = b^y = c^z$ and $b^2 = ac$ prove that $\frac{1}{x} + \frac{1}{z} = \frac{2}{y}$ 4
- (b) If $f(x) = \frac{1-x}{1+x}$ find $f\{f(\frac{1}{x})\}$ 3
- (c) Prove that $\log(1 + 2 + 3) = \log 1 + \log 2 + \log 3$ 3
- (d) Without using Venn diagram, prove that $(A \cup B)^c = A^c \cap B^c$ 5.