GLOBAL COLLEGE OF MANAGEMENT

Pre-Board Exam – 2071

Grade: XII Subject: Business Mathematics F.M.: 100
Time: 3 hrs. P.M.: 35

Set A

Students are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks. Omissions in essential parts will loss in marks.

Group-A **[10×2×3 = 60]**

1. (a) Rewrite without absolute value sign for $|3x+5| \le 1$.
   (b) In a survey report of 500 families, 325 families use filter water and 320 families use boiled water. How many families use both types of water?

2. (a) If $x+2$, $3x$ and $4x+1$ are in A.P. Find the value of x.
   (b) There are 10 varieties of birds in a zoo, the number of each variety being double of the number of another variety. If the number of first variety is 9, find the total number of all varieties of birds in zoo.

3. (a) A bag contains 8 red balls and 5 blue balls. In how many ways can 3 red balls and 4 blue balls be drawn?
   (b) If $A = \begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 4 \\ -1 & 7 \end{bmatrix}$, find $3A^2$ - 2B .

4. (a) The vertices of a parallelogram taken in order are $(1,0)$ $(4,3)$and $(1,2)$. Find the fourth vertex.
   (b) Find the equation of the line which passes through the origin and the point of intersection of $2x-3y+1=0$ and $x+2y=3$

5. (a) Compute by using log table:: $\sqrt[7]{\dfrac{(5.1)^5 \times (29)^3}{(64)^2}}$
   (b) Find the limit of $\lim\limits_{x\to 0} \dfrac{7x}{\sqrt{3x+4}-2}$

6. (a) Examine the continuity of the function defined by
$$f(x) = \begin{cases} \dfrac{x^2-4x}{x-4} & \text{for } x \neq 4 \\ 3 & \text{for } x = 4 \end{cases} \quad \text{at } x = 4$$
   (b) Find $\dfrac{dy}{dx}$ if $x = t + \dfrac{1}{t}$ and $y = t - \dfrac{1}{t}$

7. (a) Integrate: $\int \dfrac{1}{\sqrt{x+1}-\sqrt{x}}\,dx$
   (b) If the marginal cost is MC = 75-15x+x^2 and the fixed cost is Rs.1500. Find the total cost function.

8. (a) Find the mean and standard deviation of the following data: 11,14,15,17,18.
   (b) What is the probability of drawing a club or a jack from a deck of 52 cards.

9. (a) 36 men were engaged to finish a piece of work in 20 days, but at the end of 15 days, $\frac{3}{7}$ of the work remained undone. How many additional men must be employed so as to finish the work in time?
   (b) An article was sold at its marked price Rs.6,200 and a discount of 15% was allowed. The dealer still made a profit of 25%. Find the cost price.

10. (a) If the exchange between London and Paris is £1 for 14.28 Francs , between Paris and New York 100 Francs for $15, between New York and Calcutta $1 for Rs.63, between Calcutta and Moscow Rs.650 for 100 roubles. Calculate the Arbitrary rate of exchange between London and Moscow.

(b) A bill of Rs.5050 drawn for 6 months is discounted in the Bank at 4% p.a. How much does the holder of the bill receive from the bank?

Group-B **[8×5 = 40]**

11. Prove that: $\begin{vmatrix} 1 & x & yz \\ 1 & y & xz \\ 1 & z & xy \end{vmatrix} = (x-y)(y-z)(z-x)$

12. Find the derivative of $\sqrt{2x+5}$ from first principle.

13. A firm estimates that its daily total cost function is $C(x) = x^2 + 13x + 15$ and its total revenue function $R(x) = 27x$. Find the value of x that maximizes the daily profit.

14. Maximized and minimized. $G = x + 2y$ subject to the constraints: $x + y \geq 2$, $2x - y \leq 4$, $y \leq 2$.

15. Find mean deviation from mean and its coefficient:

Weight	10	12	15	16	20
No. of parts	6	14	20	13	7

16. Two partners start a business, Mr. X contributes Rs. 24,000 and Mr. Y Rs. 36,000. Mr. X receives 25% of the profit as salary as manager. At the end of 7 months Mr. X withdraws $\frac{1}{4}$ of his capital and Mr. Y withdraws $\frac{1}{6}$ of his capital. If the profit for the year amounted Rs. 24,000, what sum of money will each receive?

17. In how many years a machine costing Rs. 60,000 will be reduced to Rs.1000, providing depreciation at 5% p.a. On the diminishing balance?

18. Find the present value of an annuity of Rs. 800 a year for 20 years at 5% p.a.

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Set B

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Group-A **[10×2×3 = 60]**

1. (a) Rewrite using absolute value sign: $-1 \le x \le 3$
   (b) If $A = \{-1,0,2,4,6\}$ and f : A → R be defined by $f(x) = \frac{x}{x+2}$, find the range of f.

2. (a) If the 4th and 11th term of an A.P. are 7 and 35 respectively, find the first term and common difference.
   (b) Find the sum to $'n'$ term of the following series.5+55+555+……

3. (a) How many plates of vehicles consisting of 4 different digits can be made out of the integers 4,5,6,7,8,9?
   (b) Construct a 2×2 matrix whose elements are given by $a_{ij} = 3i - 2j$

4. (a) Find the equation of the locus of a point which moves so that it is equidistant from the point (-1,-2) and (3,4).
   (b) Find the intercepts on axes and slope of the straight line $2x + 3y = 6$

5. (a) Compute by using log table: $\sqrt[3]{\frac{57.2 \times 0.97}{1.08 \times (62.4)^3}}$
   (b) Find the limit of : $\lim_{x \to 0} \frac{\sqrt{x+4} - 2}{x^2}$

6. (a) Test the continuity of the function defined by
$$f(x) = \begin{cases} \frac{x^2 - 9}{x - 3} & \text{for } x \neq 3 \\ 6 & \text{for } x = 3 \end{cases} \text{ at } x = 3$$
   (b) Find the derivative of $\frac{1}{\sqrt{x+a} - \sqrt{x}}$

7. (a) Evaluate: $\int_1^e \log x \ dx$
   (b) Find the total revenue function and demand function when the marginal revenue function is $MR = 7 - 4x - x^2$

8. (a) Find the quartile deviation of the following data: 10,15,25,20,30,40,50.
   (b) What is the probability of drawing a heart or an ace from a deck of 52 cards.

9. (a) If 18 pumps can raise 2150 tones of water in 50 days, working 8 hours a day, how much water will be raised in 60 days by 16 pumps out of which 10 are working 9 hours a day and the rest 7 hours a day.
   (b) The cost of an article is Rs. 1500. What should be the marked price of the article in order to get 20% profit on the cost price allowing 10% discount on the marked price.

10. (a) A merchant in Nepal buys goods in London to the value of £ 1000. Find the value of goods in NC, when the rate of exchange between India and Nepal is Rs. 1.6 NC for Rs 1 IC and between London and India is £ 20 for Rs. 1690 IC.

(b) The interest on a certain sum is Rs.600 and the discount for the same time at the rate is Rs. 500. Find the sum.

Group-B **[8×5 = 40]**

11. Prove that: $\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix} = (a-b)(b-c)(c-a)$

12. Find the derivative of $\sqrt{5x+2}$ from first principle.

13. Given the demand function $P = 20 - Q$ and the total cost function $C = Q^2 + 8Q + 2$, determine the optimal output Q , price P, total profit under the profit maximization.

14. Maximize $z = 2x + 3y$ subject to the constraints:
$2x + y \le 14,\ \ x + 2y \le 10,\ \ x \ge 0,\ \ y \ge 10$

15. Find mean deviation from median and its coefficient:

Weight	10	12	15	16	20
No. of parts	6	14	20	13	7

16. Two partners start a business, Mr. X contributes Rs. 24,000 and Mr. Y Rs. 36,000. Mr. X receives 25% of the profit as salary as manager. At the end of 7 months Mr. X withdraws $\frac{1}{4}$ of his capital and Mr. Y withdraws $\frac{1}{6}$ of his capital. If the profit for the year amounted Rs. 42,000, what sum of money will each receive.

17. At what rate percent p.a. does the money becomes four times its sum in 20 years at compound interest payable half yearly.

18. Find the present value of an annuity due of Rs. 5000 a year for 10 years at 6% p.a.