GLOBAL COLLEGE OF MANAGEMENT

Pre-Board Exam – 2072

Grade: XII | Subject: Business Mathematics | F.M.:100

Time: 3 Hrs. | P.M.: 35

Set 'A'

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group A **[10×3×2=60]**

1. a) If $a+ib=\frac{x-iy}{x+iy}$ prove that $a^2+b^2=1$.

   b) Let $A=\{1,\ 4\}$ find the relation on A satisfying the condition $x<y$ for all $(x<y)\in A\times A$. Find the range of the relation.

2. a) Insert 5 geometric means between $3\frac{5}{9}$ and $40\frac{1}{2}$.

   b) Starting salary of a man is Rs. 7200 per month. If he gets an increment of Rs. 200 every year. What will his salary in the tenth year?

3. a) How many numbers of 4 different digits divisible by 5 can be formed from the integer 1, 2, 3, 4, 5, 6 and 7.

   b) If $A=\begin{pmatrix}3 & 2\\ 1 & 5\end{pmatrix}$ find a matrix *B* such that $A-3B=\begin{pmatrix}3 & 5\\ -8 & 2\end{pmatrix}$

4. a) Derive the result if the points $(a,\ 0),(0,\ b)$ and $(x,\ y)$ are collinear.

   b) Find the equation of the line through the point of intersection of $x+2y=5$, $x-3y=7$ and passing through the point $(0,\ 0)$.

5. a) Using log table, find the value of $\frac{\sqrt[3]{12.7}\times(0.84)^4}{0.625}$

   b) Find the limit of: $\lim_{x\to 5}\frac{x-5}{\sqrt{4x+5}-5}$

6. a) A function $f(x)$ is defined as follows:

$$f(x)=\begin{cases}\frac{x^2-3x}{x-3} & for\quad x\neq 3\\ k & for\quad x=3\end{cases}$$

   Find the value of *K* so that $f(x)$ is continuous at $x = 3$.

   b) Find the derivative of $\sqrt{\frac{1-x}{1+x}}$.

7. a) Evaluate: $\int_0^a \frac{x}{\sqrt{a^2-x^2}}\,dx$.

   b) Find the total revenue function and demand function when the marginal revenue function for output *x* is $MR=x^3-3x^2-4x+2$.

8. a) Find the mean deviation from mean of the following data. 40, 44, 54, 60, 62

   b) If two dice are rolled once find the probability getting sum less than six.

9. a) A contractor had to complete the work of a road in 16 days. He employed 30 persons for 12 days and completes $5/7$ of the work. How many more persons should be employed now in order to complete the work in time?

   b) An article is sold for Rs. 135 there would have been a loss equal to 50% of the original gain. Find the cost price of the article.

10. a) At what rate is the banker's discount calculated when a bill of Rs. 5000 is accepted by a bank for Rs. 4700 due 8 months.

b) Determine the exchange rate between England and Germany assuming that 1£=123.27 grains of gold $\frac{11}{12}$ fine and 10 marks = 61.4 grains of gold $\frac{9}{10}$ fine.

Group B **[8×5=40]**

11. Show that: $\begin{vmatrix} a+b+2c & a & b \\ c & c+b+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$

12. Find from the first principles, the derivatives of $\frac{2x+3}{\sqrt{x}}$.

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 and total profit under profit maximization.

14. Minimize $F(x, y) = 100x + 600y$, subject to
$x + y \le 10, \quad x + 3y \le 16, \quad x \ge 3, \quad y \ge 2$

15. Calculate the C.V. of the following distribution:

Marks	0-10	10-20	20-30	30-40	40-50
No. of Students	10	20	30	25	15

16. A and B are partners in a business and invest Rs. 2000 and Rs. 3000 respectively. A acts as manager for which he gets 25% of the profit for his service and remianing is divided in the ratio of their investment. If B gets Rs. 1350 of profit in his share what would A get.

17. A machinery costing Rs. 60,000 has as estimated life for 20 years. If in 20 years its cost is reduced by 43,000. Find the rate of compound depreciation.

18. A person retires at the age of 60 years. He is supposed to get from his office an annual pension of Rs. 3,000 payable in half yearly installment the office expects him to be alive for 13 more years and therefore, it desires to set aside a fund for allowing him the pension for the period if the sum set aside yields 8% p.a. C.I. What single sum should be set aside?

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Set 'B'

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group A **[10×3×2=60]**

1. a) If $x - iy = \frac{2-3i}{2+3i}$ prove that $x^2 + y^2 = 1$.

   b) Let $A = \{1, 2, 3\}$ find the relation in $A \times A$ satisfying the condition $x > y$ for all $(x, y) \in A \times A$. Find the domain of the relation.

2. a) Insert 3 geometric means between $\frac{16}{9}$ and 9.

   b) A man has a monthly salary of Rs. 6,500. If he gets an increment of Rs. 150 every year how much salary does he receive in 10^{th} year.

3. a) In an examination papers on Business Mathematics 10 questions are set. In how many ways can you choose 6 questions to answer. If question number 1 is compulsory.

   b) If $A = \begin{pmatrix} 3 & 2 \\ 1 & 5 \end{pmatrix}$ find a matrix X such that $A - 3X = \begin{pmatrix} 3 & 5 \\ -8 & 2 \end{pmatrix}$

4. a) Find the equation of the straight line passing through the points $(4, 7)$ and $(2, y)$ if it's slope $-\frac{3}{2}$.

   b) Find the value of K, if the lines $2x - 3y + K = 0$, $3x - 4y - 13 = 0$ and $8x - 11y - 33 = 0$ are concurrent.

5. a) Using log table, evaluate: $\frac{2731 \times (0.0354)^3}{\sqrt[5]{0.224}}$

   b) Evaluate: $\lim_{x \to 0} \frac{7x}{\sqrt{3x+4} - 2}$

6. a) Test the continuity of the function

$$f(x) = \begin{cases} \frac{x^2 - 4x}{x - 4} & when \quad x \neq 4 \\ 4 & when \quad x = 4 \end{cases}$$ at $x = 4$.

   b) Find $\frac{dy}{dx}$ of $x^2 + y^2 = 3a\,xy$.

7. a) Evaluate: $\int_0^1 x^3 \sqrt{2 + 3x^4}\ dx$.

   b) If the marginal cost of a product is $x^2 - 3x + 2$ where x is the number of units produced and if the cost producing one unit is Rs. 10. Find the total cost function.

8. a) Compute Mean deviation from median of the following individual series. 35, 52, 53, 56, 58, 52, 50, 51, 49

   b) The chance that A can solve a certain problem is $2/3$ and the chance that B can solve it is $3/4$. Find the chance that the problem would be solved by at least one of them.

9. a) If the four quantities a, b, c and d are such that $a : b = 2 : 3$, $b : c = 4 : 5$ and $c : d = 7 : 9$. Find the ratio between a and d, also find the continued ratio.

   b) An article was sold at its marked price Rs. 6,200 and discount of 15% was allowed the dealer still made a profit of 25%. Find the cost price.

10. a) A purchased goods for Rs. 1500 and agreed to pay after six months with interest 10% p.a. Find the true discount payable by him.

b) If Rs. 126.36 = £1, 50p = 3.52 marks, 4.8 francs = $1, 3.91 marks = 1$. Find the arbitrary rate of exchange between France and Kathmandu.

Group B **[8×5=40]**

11. Show that: $\begin{vmatrix} x-y-z & 2x & 2x \\ 2y & y-z-x & 2y \\ 2z & 2z & z-x-y \end{vmatrix} = (x+y+z)^3$

12. Find from the first principles, the derivatives of $\frac{3x+5}{\sqrt{x}}$.

13. The demand equation for a certain commodity is $p = \frac{1}{12}Q^2 - 10Q + 300$. Find the value of Q and the corresponding price p that maximize the revenue.

14. Find the minimum value of the objective function

$Z = 5x + 8y$, subject to

$2x + 5y \le 15$

$x \ge 2$

$y \ge 1$

15. Obtain the variance from the following distribution:

Wages	0-20	20-40	40-60	60-80	80-100
No. of workers	10	12	15	8	5

16. Eliza, Dipika and Sirjana started a business with capitals Rs. 5,000, Rs. 4,500 and Rs. 6,500 respectively. After 6 months, Eliza doubles her capital and after next 3 months, Dipika trebles her capital. If the profit at the end of the year amounted to be 8,300. Find the profit obtained by each of Eliza, Dipika and Sirjana.

17. A machine costing Rs. 24,000 is estimated to have a life of 8 years. By charging depreciation on the reducing balance, if its breakup value after this period is estimated at Rs. 4,000 find the rate of depreciation.

18. A person retires at the age of 60 years. He is supposed to get from his office an annual pension of Rs. 4,000 payable in half yearly installment the office expects him to be alive for 13 more years and therefore, it desires to set aside a fund for allowing him the pension for the period if the sum set aside yields 8% p.a. C.I. What single sum should be set aside?

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