GLOBAL COLLEGE OF MANAGEMENT

SECOND TERM EXAM-2070

Grade: XII Subject: Business Mathematics F.M.:100
Time: 3:00 hrs. P.M.:40

Set A

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

Group "A" [10×2×3=60]

Attempt **all** questions:

1. (a) If $x = 3 + 2i$, $y = 3 - 2i$, determine the value of $x^2 + xy + y^2$
   (b) In an examination, 56% of the students failed in English 48% failed in Science. If 18% failed in both subjects, find the percentage of those who passed in both the subjects.

2. (a) Shyam borrows a loan of Rs.4000 from Krishna and agrees to repay in a number of installments, each installment greater than the previous one by Rs. 20.If the first installment is Rs. 10, find how many installment will be necessary to pay off the debt.
   (b) The sum of three numbers in a G.P. is 14 and their product is 64. Find the numbers.

3. (a) In how many ways can a committee of 6 members be selected from 5 men and 4 women consisting of at least 3 women?
   (b) How many plates of the vehicles consisting of 4 different digits can be made out of the integers 4, 5, 6, 7, 8, 9 ?

4. (a) Obtain the locus of a point which moves so that its distance from (2, 3) is half the distance from x-axis.
   (b) Find the equation of the straight line passing through the points (8, 14) and (4, y) if its slope is $\frac{1}{2}$.

5. (a) If, $A = \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 5 & -2 \\ -1 & 6 \end{bmatrix}$ and $C = \begin{bmatrix} 0 & 2 \\ 1 & -3 \end{bmatrix}$ verify that: $A(B + C) = AB + BC$
   (b) Evaluate : $\lim_{x \to 3} \frac{x-3}{\sqrt{x-2}-\sqrt{4-x}}$

6. (a) Discuss the continuity of the function at the point specified
$$f(x) = \begin{cases} 5x - 4 & \text{for } 0 < x < 1 \\ 4x^2 - 3x & \text{for } 1 < x < 2 \end{cases} \text{ at } x = 1$$
   (b) Find the derivative of $y = e^{2x} \log x$.

7. (a) Find $\frac{dy}{dx}$, if $xy - x - y = 1$
   (b) Find the two numbers whose product is 64 and whose sum is a minimum.

8. (a) Evaluate: $\int_0^1 \frac{(6x-4)}{(3x^2-4x+5)^2}\,dx$
   (b) Evaluate: $\int (3x + 5)\sqrt{2x-1}\,dx$

9. (a) If the marginal cost of product is given by $MC = 3 - 10x + 6x^2$ and the fixed cost is Rs 200. Find the total cost and average cost function.
   (b) Find the mean deviation from the median in the following data:
   Price (Rs): 25, 28, 32, 44, 50
   Also calculate the coefficient of mean deviation.

10. (a) Two men rent a field. A puts in 14 oxen and keeps them for 6 weeks and B put in 10 oxen for 5 weeks. If A's share of rent is 150, find the rent paid by B ?

(b) The catalogue price of a radio is 40% higher than its cost price. The dealer discounts 20% on the catalogue price to the customer, find the profit percent of the dealer.

Group "B" **[8×5=40]**

Attempt **all** questions:

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

12. Find from first principles, the differential coefficient of function:

$$\frac{1}{\sqrt{x}}$$

13. Find the maximum and minimum value and point of inflection of $f(x) = 4x^3 - 6x^2 - 9x + 1$

14. Find the minimum values of the objective function with the given constraints:

F = 10x + 12y subject to $4x + 3y \leq 24$; $x + 2y \geq 4$; $x, y \geq 0$

15. Find the mean, standard deviation and the coefficient of variation of the following distribution:

Wages (in Rs) :	0–4	4–8	8–12	12–16	16–20	20–24
No. of persons :	7	7	10	15	7	6

16. Two partners start a business. A contributes Rs 12000, B Rs 18000. B was to have 15% of the profit for his salary as manager. At the end of 7 months A withdraws $\frac{1}{3}$ of his capital and two month latter B withdraw $\frac{1}{2}$ of his capital. Profits for the year amounted to Rs 3130. What sum of money ought each to receive ?

17. A merchant of New York bought some goods from Nepal worth Rs. 26576. If 1 dollar = Rs. 16 and £ 1 = Rs. 22.22 and if by sending the money through London he saves 16.25 dollars. Find the rate of exchange between New York and London.

18 A bill of Rs. 1750 issued on 29th. May 1990 for 4 months; was discounted at a bank at 8% p.a. simple interest on 21st. July 1990. How much will the bank pay?

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Set B

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Group "A" [10×2×3=60]

1. (a) If $\sqrt{x - iy} = a - ib$ prove that $\sqrt{x + iy} = a + ib$
   (b) All the students of a school play basketball or volleyball or both. If 70% plays basketball and 65% plays volleyball, what percent of students play basketball only?

2. (a) A person borrows Rs 19682 and pays it back in 9 annual installments, each install being double of the preceding one. Find the first installment. Ignore interest.
   (b) The sum of three numbers in an A.P. is 21 and the sum of their squares is 155.Find the terms.

3. (a) How many different words can be formed from the letter of the words BUSINESS ?
   (b) In how many ways can a committee of 6 members be selected from 5 men and 4women consisting of at most 2 women?

4. (a) Find the equation of the locus of a point which moves so that it is equidistant from the points (–1, –2) and (3, –4).
   (b) If A (3, 7), B (5, –7) and C (–2, 5) are the three co-ordinates of a parallelogram ABCD find the co-ordinates of the fourth vertex D opposite to the vertex B.

5. (a) If $A = \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 5 & -2 \\ -1 & 6 \end{bmatrix}$ and $C = \begin{bmatrix} 0 & 2 \\ 1 & -3 \end{bmatrix}$ verify that A(BC) = (AB)C
   (b) Test continuity or discontinuity of the following function at the specified point

$$f(x) = \begin{cases} \dfrac{x^2 - 3x + 2}{x - 2} & \text{for } x \neq 2 \\ 1 & \text{for } x = 2 \end{cases} \quad \text{at } x = 2$$

6. (a) Evaluate : $\lim_{x \to 0} \dfrac{x}{1 - \sqrt{1 - x}}$
   (b) Find the derivative of $y = \dfrac{1}{x + \sqrt{a^2 + x^2}}$

7. (a) Find $\dfrac{dy}{dx}$, given that : $x = t + \dfrac{1}{t}$, $y = t - \dfrac{1}{t}$
   (b) Divide 40 into two parts in such a way that the sum of the squares of the parts is a minimum.

8. (a) Calculate quartile deviation and its coefficient in following data.
   14, 9, 14, 3, 5, 9, 21, 6, 3, 9, 18, 5, 12
   (b) Evaluate: $\int \dfrac{1}{x(1 + \log x)}\, dx$

9. (a) An article was sold at its marked price Rs 6200 and a discount of 15% was allowed. The dealer still made a profit of 25%. Find his cost price.
   (b) If 18 pumps can raise 2150000 liters 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?

10. (a) If the marginal cost function $C'(Q) = 2 + 3Q + \dfrac{5}{\sqrt{Q}}$, find total cost function C (Q) when C (1) = 20.

(b) Evaluate: $\int_{-1}^{1} \frac{x-3}{x^3}\,dx$

Group "B" **[8×5=40]**

Attempt **all** questions:

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

12. Find from first principles, the differential coefficient of function:

$y = \frac{1}{1-x}$

13. Find the maximum, minimum and the point of inflection (if any) of the function: $y = 2x^3 - 9x^2 + 12x - 4$.

14. Using the graphical method, determined the maximum value of the function defined by $F(x, y) = 10x + 15y$ subject to $x + 2y \leq 20$, $x + y \leq 16$, $x, y \geq 0$

15. Compute the mean deviation from mean for the following series. Also find out its coefficient.

Marks:	0–10	10–20	20–30	30–40	40–50
No. of students:	5	8	15	16	6

16. Three partners start a business. A contributes Rs 15000. B contributes Rs 20000 and C contributes Rs 24000. B receives 20% of the profit for his salary as manager. At the end of 5 months A withdraws $\frac{1}{3}$ of his capital and at the end of 7 months C withdraws $\frac{1}{4}$ of his capital. Profit for the year amounted of Rs 35000, what sum of money would A, B and C receive?

17. Ram exchanged the amount of Rs 24000 in pound at the rate of Rs 1 = £ 0.045 at the time of his departure to England. There, he spent £ 1000. After returning to Nepal he exchanged his balance in £ at the rate of Rs 1 = £ 0.04. Calculate the expenditure of the tour in rupees.

18. When the bill of Rs. 1118 was discounted, the bank paid Rs. 1050.80 at 10% p.a. simple interest. If the bill was issued on 17th. March 1989 for 11 months, find the date of discounting.