GLOBAL COLLEGE OF MANAGEMENT

FIRST TERM EXAM-2071

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

Time: 3:00 hrs. P.M.:40

Set A

Attempt all the questions:

Group-A
[10×2×3 = 60]

1. a. Rewrite using the modulus sign for $-6 \le x \le -1$.

   b. Find the modulus of $\dfrac{(1-i)^3}{1-i^3}$

2. a. In a survey of a city market, it was found that 143 families used Colgate toothpaste, 135 used Everest toothpaste and 70 families used both. Find the number of families using at least one type of toothpaste.

   b. If $A = \{-1, -\frac{1}{2}, 0, \frac{1}{2}, 1, \frac{3}{2}\}$ and $f : A \to R$ be a function defined by $f(x) = 2x + 1$. Find the range of f.

3. a. Divide 69 into three parts such the parts may form an A.P and the product of the first two terms is 483.

   b. Find the sum 'n' term of the following series: 7+77+777+…….

4. a. Without expanding show that the value of determinant is zero.

$$\begin{vmatrix} 1 & bc & bc(b+c) \\ 1 & ca & ca(a+c) \\ 1 & ab & ab(a+b) \end{vmatrix}$$

   b. If $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 1 & 2 & 0 \end{bmatrix}$, Find the product AB and BA. Also comment on the results.

5. a. Prove that $\begin{vmatrix} 1 & x & x^3 \\ 1 & y & y^3 \\ 1 & z & z^3 \end{vmatrix} = (x-y)(y-z)(z-x)(x+y+z)$

   b. Find the co-ordinates of the points on the x-axis which are at a distance of 10 units from the point (4,6).

6. a. If $A(-1,0), B(3,-1)$ and $C(2,2)$ are the three vertices of a parallelogram. Find the co-ordinate of the fourth vertex.

   b. A profit making company wants to lunch a new product. It observes that the fixed cost of the new product is *Rs.35,000* and also the veriable cost for unit is *Rs.500*. The revenue function for the sales of x units is given by $500x + 100x^2$. Find
   (i) Cost function and profit function.
   (ii) Cost at the production level 20.

7. a. Evaluate: $\lim_{x \to 4} \dfrac{x^2 - 16}{\sqrt{3x+4} - 4}$

   b. Find $\dfrac{dy}{dx}$ if $y = \dfrac{1}{\sqrt{2x-3} - \sqrt{2x-5}}$

8. a. Find $\dfrac{dy}{dx}$ when $y = 4u^2 + 5u - 4$ and $u = \sqrt{3-4x}$.

   b. If 30 men can do a piece of work in 11 days working 9 hours a day , how many hours a day have 55 men to work in order to finish another work thrice as great in 18 days.

9. a. Ram and Mohan hired pasture for Rs.65 for 17 days. Ram puts in 8 cows for a certain number of days and pays Rs.44. Mohan puts in 7 cows for the remaining number of days and pays the remaining sum. For how many days does Mohan put his cows?

   b. A bicycle agent allows 20% discount on his advertised price and yet gain 15%. What is the advertised price of a bicycle on which he gains *Rs.24*.

10. a. Sukhi and Kushi entered into partnership invested *Rs.10,000* and *Rs.7500* respectively. They passed an agreement that after charge 6% interest on their respective capitals, the balance of the profit, if any should be shared by them in equal ratio. Find the share of each partner, if the business makes a profit of is *Rs.6400*.

b. If 2 kgs of mangoes are worth 4 kgs of oranges , 9 kgs of oranges are worth 4 kgs of apples and 6.25 kgs of apples are worth 3 kgs of grapes, then how many kgs of mangoes is worth 7 kgs of grapes?

Group 'B'
[8×5=40]

11. Solve the equations by using Gramer's rule $x-2y+3z=22$, $2x-3y-z=5$, $3x+y-5z=-32$

12. A man starts repaying a loan with first installment of Rs.100. If he increases the installment by Rs.5 every month, what amount will be paid by him in the 40^{th} installment? Find the amount of loan if loan is cleared by 50^{th} installment. Ignore interest.

13. Discuss the continuity or discontinuity of the functions:

$$f(x)=\left\{\begin{array}{lll} 3+2x & \text{for} & -3/2 \le x < 0 \\ 3-2x & \text{for} & 0 \le x < 3/2 \\ -3-2x & \text{for} & x \ge 3/2 \end{array}\right\} \text{at } x=0$$

14. Find the derivative $\dfrac{1}{\sqrt{3x-1}}$ from first principle.

15. 36 men were engaged to finish a piece of work in 20 days, but at the end of 15 days, $\dfrac{3}{7}$. of the work remained undone . How many additional men must be employed; So as to finish the work in time?

16. A person bought 50 goats *Rs.2,200* a goat and fixed the selling price of each goat, So as to gain 16%. But 10 goats died. He sold the remaining goats at the same intended price. What is his gain or loss percent.

17. Determine the part of exchange rate between England and Germany assuming that £1=123.27 gains of gold $\dfrac{11}{12}$ fine and 10 marks=61.4 gains of gods $\dfrac{9}{10}$ fine.

18. Two partners start 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 $\dfrac{1}{4}$ of his capital and Mr. Y withdraws $\dfrac{1}{6}$ of his capital. If the profit for the year amounted to *Rs.42,000*. What sum of money will each receive?

GLOBAL COLLEGE OF MANAGEMENT

FIRST TERM EXAM-2071

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

Time: 3:00 hrs. P.M.:40

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.

Attempt all the questions:

Group-A

[10×2×3 = 60]

1. a. Rewrite $|5x-7| \le 3$ without absolute value sign.

   b. If $x+iy = \sqrt{\dfrac{1+i}{i-1}}$, show that $x^2+y^2=1$

2. a. In a city of 26000 populations, 5000 read English local Newspaper, 12000 read Nepali local Newspaper and 1000 read both. What percentage read neither English nor Nepali Newspaper?

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

3 a. Find four arithmetic means between $\dfrac{1}{2}$ and $4\dfrac{1}{4}$.

   b. Find three numbers in geometric progression whose sum is 14 and whose product is 64.

4 a. Without expanding show that the value of determinant is zero.

$$\begin{vmatrix} 1 & bc & 1/a \\ 1 & ca & 1/b \\ 1 & ab & 1/c \end{vmatrix}$$

   b. If $A=\begin{bmatrix} 4 & 2 & -1 \\ 3 & -7 & 1 \end{bmatrix}$ and $B\begin{bmatrix} 2 & 3 \\ -3 & 0 \\ -1 & 5 \end{bmatrix}$, find the product AB and BA.

   Also,comment on the result.

5 a. Prove that $\begin{vmatrix} 1 & a & a^3 \\ 1 & b & b^3 \\ 1 & c & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)$.

   b. Find the value of y if the distance between the point $(7,y)$ and $(3,2)$ is 5.

6 a. The centroid of a triangle is (10,3). It's two vertices are (-4,-6) and (2,-2), find the third vertex.

   b. A book publisher finds that production costs associated with each book is Rs.30 and fixed cost is Rs.25,000. If each book is sold for Rs.50.
   (i) Find the cost function and profit.
   (ii) If the publisher wants to make a profit of Rs15,000, how many books should he sell?

7 a. Evaluate: $\lim\limits_{x\to 5}\dfrac{x-5}{\sqrt{4x+5}-5}$.

   b. Find $\dfrac{dy}{dx}$ if $y=\dfrac{1}{\sqrt{x+a}-\sqrt{x-b}}$.

8 a. Find $\dfrac{dy}{dx}$ when, $y^2=3t^2+2t+1$ and $t=\sqrt{2x+3}$

   b. If 9 cows can plough a piece of land in 15 days working 8 hours a day, how many hours a day have 12 cows to work to plough a land twice as great is 18 days.

9 a. In a race of 1 kilometer, Mr. X beats Mr. Y by 70 meters , Mr. Y beats Mr. Z by 80 meters. By how much does Mr. X beats Mr. Z?

   b. An article is sold for Rs.150 at a gain. If it has been 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. Mari and Pari invested Rs.60,000 and Rs.36,000 is a firm. They agreed to receive 10% interest on their capitals out up the annual profit and the remaining profits are shared in the ratio of their capitals. If Mari receive a total amount of Rs.16,500. Find the Pari's share.

   b. 8 chairs cost as much as 3 desks, 6 desks cost as much as 2 daraj's, 7 daraj's cost as much as 2 sofas. If 4 sofas cost Rs.10,000, find the cost of a chair.

Group 'B'
[8×5=40]

11 Solve the equation by using Cramer's rule.

$2x+3y+z=14,\ 3x-4y-2z=-30,\ 5x+7y+3z=32$

12 A man starts repaying a loan with first installment of Rs.100. If he increase the installment by Rs.5 every month, what amount will be paid by him in the 30^{th} installment. Find the amount of loan if loan is cleared in 50^{th} installment. Ignore interest.

13 Discuss the continuity or discontinuity of the function;

$$f(x)=\begin{cases} 2x^2+3 & \text{for} \quad x<1 \\ 5 & \text{for} \quad x=1 \quad \text{at } x=1 \\ 4x+1 & \text{for} \quad x>1 \end{cases}$$

14 Find the derivative of $\frac{1}{\sqrt{2x+3}}$ from first principle.

15 If the railway carriage for 840 kgs for the distance of 40 kms is Rs.210. What will be the charge for converging 950 kgs for 120 kms, calculating half rate for last 40 kms.

16 A man sell two articles for Rs.1955 each. On one of them he gains 15% and on the other he losses 15%. Find the total gain or loss.

17 Determine the par of exchange between London and New York. If £1 contains 61.635 gains of gold $\frac{11}{12}$ fine and 1 dollar contained 25.8 grains of gold $\frac{9}{10}$ fine.

18 A and B starts a business with business with capitals Rs.15,000 and Rs.21,000. They withdraw respectively $\frac{2}{3}$ and $\frac{3}{4}$ of their capitals at the end of 4 and 6 months. At the end of the year a profit of Rs.2660 is divided. Find the share of each.