[REF]

Whitefield International College

Town Planning, Nayabazar, Kathmandu

ASSIGNMENT

Class: XII F.M-100

Subject: Business Maths P.M.-40

Attempt all questions. **Group "A"** **10X2X3=60**

1. a) Rewrite using absolute value sign $-4 \le x \le -1$.

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

2. a) In a town of 5000 population 28000 read Gorkhapatra and 5000 read Rising Nepal and 1000 read both. What percentage read neither Gorkhapatra nor Rising Nepal?

   b) Let A={2, 3, 4} and B={3, 4, 6}. Find AXB. Also find the relation from set A to set B satisfying the condition x+y>8.

3. a) The population of a town was 18395 ten years ago, has lost 270 inhabitant each year since then. What is the present population of small town.

   b) Find the sum of the following series. 4-1-6-11-16-… to 7 terms.

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

   b) Find the sum of the following series 64+32+16+…. To 5 terms.

5. a) If $A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$, show that $A^2 - 4A - 5I = 0$, here I is a 3X3 unit matrix.

   b) Construct a 3X3 matrix whose elements aij given by $a_{ij}=i_j$.

6. a) Show that the points (4, 0), (2, 3) and (8, -6) are collinear.

   b) A point moves so that its distance from the point (a,0) is always twice the distance from the point (0, -a). Find the equation to its locus.

7. a) Reduce the following equation of lines into slope intercept and double intercepts form. $6x + 5y = 18$.

   b) Where do the straight line passing through the points (1, 3) and (-1, 2) intersect x-axis and y-axis?

8. a) Using 4-figure log table, evaluate $\frac{\sqrt[3]{42.75}}{(3.67)^2}$

   b) Find the value of x, $340 \times \left(1 + \frac{x}{100}\right)^7 = 621$.

9. a) A book publisher finds that the production cost associated with each book is Rs. 30 and the fixed cost is Rs. 25000. Each book is sold at Rs. 50. Find the cost function and the profit function.

   b) Evaluate : $\lim_{x \to \infty} \frac{\sqrt{3x^2 4x + 5}}{2x - 1}$.

10. a) Prove that : $\lim_{x \to \infty} \sqrt{x} \quad (\sqrt{x+a} - \sqrt{x}) = \frac{a}{2}$.

    b) Is the following function continuous at the point mentioned.

$$f(x) = \begin{cases} 6x - 1 & for \quad x \ge 1 \\ 3x + 2 & for \quad x < 1 \end{cases} \quad at\ x = 1.$$

Group "B" **8X5=40**

11. By using first principle, find derivative of $\sqrt{2x+3}$.
12. By using definition method, find the derivative of $x(x+1)$.
13. Find the derivatives of

    a) $x + y = xy$

    b) $\frac{1}{\sqrt{2x-3} - \sqrt{2x+5}}$

14. Solve the equations using cramer's rule.

$$9y - 5x = 3$$
$$x + z = 1$$
$$z + 2y = 2$$

15. Prove that $\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix} = abc(a-b)(b-c)(c-a)$.

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

17. The demand equation for a certain commodity is

    $P = \frac{1}{12}Q^2 - 10Q + 300 \left(0 \le Q \le 60\right)$. Find rhe value of Q and the corresponding price P that maximizes the revenue.

18. Investigate the maxima or minima for the following function. Also find the point of inflection. $y = 2x^3 + 3x^2 - 36x - 28$.

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1. a) Find the sum of the series.
   49+44+30+ …… 17 terms
   b) A small town whose population was 12, 317 ten years ago has lost, 250 inhabitants each since then. What is the present population of town?
2. a) Insert 3 geometric mean by $2\frac{1}{4}$ and 36.
   b) Find three numbers in geometric progression whose sum is 14 and whose product is 64.
3. a) If $A=\begin{pmatrix}1 & 2\\ 3 & 1\end{pmatrix}$ show that $A^2-2A-5I=0$, where I & O are identity null matrix respectively.
   b) If $A=\begin{pmatrix}4 & 2 & -1\\ 3 & -7 & 1\end{pmatrix}$ and $B=\begin{pmatrix}2 & 3\\ -3 & 0\\ -1 & 5\end{pmatrix}$, find the product AB & BA. Also comment on the result.
4. a) Prove that the points (4, 8) (0, 2) (3, 0) and (7, 6) are the vertices of a parallelogram.
   b) Where do the straight line passing through the points (1, 3) & (-1, 2) intersect x-axis and y-axis?
5. a) Find the equation of a straight line passing through the points (5, -3) and having slope $\frac{-3}{4}$.
   b) Find the equation of the locus of a point which moves so that it is always equidistance from the points (1, 3) and (-2, 6).
6. a) Find the coordinates of the point which divided internally the line joining the points (-3, 9) and (1, -3) in the ratio 3:1.
   b) Show that the points (5, 1), (1, -1) and (11, 4) are collinear.
7. a) Calculate the mean deviation from mean of the following frequency table.

Bonus	10	15	20	25
Frequency	3	5	5	7

   b) Find the standard deviation of the following data.
   10, 15, 25, 20, 30, 40, 50, 10
8. a) Evaluate the following using 4-figure log table.
   $\sqrt[3]{\frac{9620}{108\times(62.4)^3}}$
   b) Evaluate the following using 4-figure log table.
   $\frac{\sqrt[3]{42.75}}{(3.678)^2}$
9. a) A contractor had to complete the work of a road in 16 days. He employed 30 persons for 12 days & complete 5/7 of the work. How many more persons should be employed how in order to complete the work in time?
   b) A & B hired a pasture at Rs. 60 for 20 days. A puts in 20 cows for a certain number of days and pays Rs. 40. B puts in 15 cows for the remaining days and pays remaining sum. For how long A puts his cows?
10. a) An article is sold for Rs. 150 at a gain. Had it been sold for Rs. 135 there would have been a loss to 50% of the original gain. Find the cost price of the article.
    b) A shopkeeper buys a watch for Rs. 300 and marks it at such a price that he may make a profit of 25% after allowing a discount of 10%. Find the marked price.

Group "B **8X5=40**

11. Solve the following equations using Cramer's rule:
    $x-2y+3z=10$
    $2x+3y-2z=1$
    $-x-2y+4z=13$
12. Prove that $\begin{vmatrix}I & a & bc\\ I & b & ca\\ I & c & ab\end{vmatrix}=(a-b)(b-c)(c-a)$
13. Calculate the mean & standard deviation of the following data.

Marks	0-10	10-20	20-30	30-40	40-50
No. of Students	7	12	24	10	7

14. The following distribution gives the marks of 30 students in a certain examination.

Marks	20-30	30-40	40-50	50-60	60-70	70-80
No. of Students	3	5	6	8	4	4

    Find the quartile deviation.
15. Using first principle method, find the derivative of $\frac{1}{x}$.
16. Find the maximum and minimum value of $f(x)=2x^3-9x^2+12x-4$

17. A, B & C engage in a business with a joint capital of Rs. 18000. A gives Rs. 2000 more than B & B Rs. 2000 more than C. Divide a profit of Rs. 1080 among them.
18. A started business with a capital of 7000 in the beginning of the year. After 4 months he admitted B with a capital of Rs. 6000, after 6 months they admitted C with a capital of Rs. 8000. If the profit at the end of the year amounts to Rs. 15000, find their profits individually.

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Attempt all questions. **Group "A"** **10X2X3=60**

1. a) Express the following complex number in the form of A+ib. $\frac{3-\sqrt{-4}}{2+\sqrt{-1}}$.

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

2. a) Rewrite the following using absolute value sign $-4\le x\le -1$.

   b) Insert 5 A.M's between 1 & 43.

3. a) The sum of the three numbers is A.P is 15. Then sum of their squares is 83. Find out the numbers.

   b) The sixth term of an A.P is 22 & the ninth term is 16, find the series in A.P.

4. a) Sum the series to n terms 7+77+777+7777+…..

   b) Find which term of the series $2+1+\frac{1}{2}+\frac{1}{4}+.....is\frac{1}{128}$.

5. a) A person barrows Rs. 19682 &pays it back in 9 annual installments, each installment being treble of the preceding one. Find the first & last installment. Ignore, interest.

   b) How many license plates consisting of 3 different digits can be made out of given integers 1, 2, 3, 4, 5, 6?

6. a) A boy puts his hand into a bag which contains 10 different colored marbles & brings out 3. How many different results are possible?

   b) From 10 persons in how many ways can a selection of 4 be made when 2 particular person is always included.

7. a) Using 4-figure log table, evaluate.

   $$\sqrt[7]{\frac{(5.1)^5\times 29^3}{(64)^2}}$$

   b) Without using logarithm table, find the value of $\log\frac{81}{16}-\log\frac{8}{3}+\log\frac{128}{243}$.

8. a) Rs. 3190 is paid in 20, 10, 5 rupee notes in the ratio of 3:5:7. How many of each were there?

   b) A contractor undertook to make 15km of a road in 40 weeks. In 10 weeks, 3km were completed by 180 men working 8 hours a day. Then the men agreed to work one hour a day overtime & some boys being engaged to assist the work was finished in the fixed time. How many boys were employed if the work of 3 boys was equal to that of 2 men?

9. a) A article is marked to sell at a profit of 16%. It it is sold for Rs. 62.50 less, thee will be a loss of 9%. Find the cost price.

   b) A tea dealer mixed 65kg of tea with 75kg of a better quality & by selling the mixture at Rs. 210 per kg, he gained 25% on his outlay. Find the cost of each kind of tea, the difference in prices being Rs. 30 per kg.

10. a) An article is sold for Rs. 150 at a gain. Had it been sold for Rs. 135 there would have been a loss to 50% of the original gain. Find the cost price of the article.

    b) Find the standard deviation of the following data.
    10, 15, 25, 20, 30, 40, 50, 10

Group "B **8X5=40**

11. Find 1st derivative of $\sqrt{2x+3}$

12. Find $\frac{dy}{dx}$ in the following cases

    i) $x=t+\frac{1}{t}, y=t-\frac{1}{t}$

13. Ram & Shyam entered into partnership investing Rs. 10000 & Rs. 7500 respectively. They passed an agreement that after charging 6% interest on their respective capital, 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 Rs. 6400.

14. Sita, Rita & Gita start a business with a capital of Rs. 21000. If this Sita gives Rs. 1000 more than Gita & Rita Rs. 2000 more than Gita. At the end of the year the profit to be divided is 16% of the total capital. What should each receive?

15. A & B started business with capitals of Rs. 5000 & Rs. 4000 respectively, after 6 months they admitted C with a capital of Rs. 8000. If the profit at the end of the year amounts to Rs. 13000, find the profit according to time devotion.

16. Calculate the standard deviation from the following frequency distribution.

Wages (in Rs.)	0-4	4-8	8-12	12-16	16-20	20-24
No. of person	7	7	10	15	7	6

17. Find the quartile deviation from the given data.

Marks	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	3	5	6	8	4	4

18. Find the mean deviation from the given data.

Marks	10	15	20	25	30
No. of Students	2	4	6	8	5

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1. a) Rewrite using absolute sign $-7<-2x+3<5$.
   b) Find the values of x and y if $5x+(3x-y)i=10+2i$
2. a) Let $P=\{1,2,3\}$. Find the relation in $p\times p$ satisfying the condition $x>y$ for all $(x,y)\in p\times p$. Find the domain of the relation.
   b) If $f(x)=x+|x|$, find $f(2)$ and $f\left(\frac{-5}{2}\right)$.
3. a) The 8th term and 102nd term of and AP are 23 and 305 respectively. Find the series.
   b) Divide 45 into three parts which are in A.P. such that the product of last two is 300.
4. a) Sum the series to n terms :
   8+88+888+8888+.... to n terms
   b) How many numbers of 3 digits can be formed from integers 3, 4, 5, 6, 7?
5. a) In how many ways can 6 players be selected from 7 men and 5 ladies consisting of 4 men and 2 ladies?
   b) If $A=\begin{pmatrix}1&2\\3&4\end{pmatrix}, B=\begin{pmatrix}1&0\\2&-3\end{pmatrix} and\ C=\begin{pmatrix}1&-1\\0&1\end{pmatrix}$, verify that $A(BC)=(AB)C$.
6. a) Prove that $(4,8)$ $(0,2)$ $(3,0)$ and $(7,6)$ are the vertices of a parallelogram.
   b) Find the ratio in which x-axis cuts the join of the points $(4,5)$ and $(-10,-2)$. Also find that point on $x-axis$.
7. a) For what value of K will the points $(1,4)$ $(-3,16)$ and $(K,-2)$ lie in one straight line?
   b) Find the value of $\frac{\sqrt[3]{42.75}}{(3.6)^2}$.
8. a) Find quartile deviation from data given
   67, 83, 85, 70, 52, 36, 51
   b) If 80 persons can perform a work in 16 days of a 10 hours each, how many men will perform a piece of work twice as great in tenth past of the time working 8 hours a day supposing that three of the second set can be do as much work as four of the first set.
9. a) The value of the diamond varies as at the square of its weight. A diamond consisting Rs. 9720 is broken into 3 pieces the weights of the pieces are in the ratio 2:3:4. Find the reduction in the value by the breakage.
   b) An article is sold for Rs. 150 at a gain. Had it been sold for Rs. 135, there would have been a loss to 50% of the original gain. Find the cost price of the article.
10. a) Ram buys an article and sell it to Shyam at a profitof 10%, Shyam sells it to Hari at a gain of 20%. If Hari paid Rs. 924 for it, what did Ram pay for it?
    b) Find the arbitrary rate of exchange between Euro (£) in Italy and (Rs) in Kathmandu as Rs. 130=£1, 50P=1.97 marks, 7.62 France= $\in 1$ and 2.98 Franc=1 mark.

Group "B **8X5=40**

11. Using cramer's rule, solve the equations.
    $3x+2y+4z=9$
    $2x+y+5z=5$
    $6x+3y-2z=15$
12. Prove that
    $$\begin{vmatrix}a+x&b&c\\a&b+y&c\\a&b&c+z\end{vmatrix}=xyz\left(1+\frac{a}{x}+\frac{b}{y}+\frac{c}{z}\right)$$
13. Minimize $F=8x-5y+40$ subject to
    $x+2y\le 10$
    $x-y\le 1$
    $x\ge 0, y\ge 0$
14. Using 1st principle, find derivative of x^3+2x
15. Find the mean and standard deviation from the following frequency distributions.

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	7	12	24	10	7

16. An analysis of monthly wages paid to the workers in two firms A and B belonging to the same industry give following results.

	Firm A	Firm B
No. of workers	500	600
Average monthly wages:	Rs. 586	Rs. 575
Standard deviation of distribution of wages:	Rs. 9	Rs. 10

    i) In which firm A or B, is the greater variability in individual wages? In which firm is the distribution of wages uniform?

ii) Calculate the average monthly wage and the standard deviation of wages of all the workers of the firms A and B taken together.

17. A started a business with a capital of Rs. 7000 in the beginning of the year. After 4 months he admitted B with a capital of Rs. 6000, after 6 months they admitted C with a capital of Rs. 8000. If the profit at the end of the year amounts to Rs. 15000, find their profits individually.
18. Buddha & Mohan started business with capitals Rs. 2400 and Rs. 3000 respectively. Of a total gain of 800, Mohan who has contributed his capital for 4 month receives Rs. 500. Find how long Buddha has contributed his capital.

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   b) A point moves so that its distance from the point (a,0) is always twice the distance from the point (0, -a). Find the equation to its locus.
7. a) Where do the straight line passing through the points (1, 3) and (-1, 2) intersect x-axis and y-axis?
   b) Butter is quoted at Rs. 1360 per kg or £4.60 per lb. Which is cheaper if £1= Rs. 135 and 1kg = 2.2 lbs.
8. a) Calculate the mean deviation from mean of the following frequency table.

Bonus	10	15	20	25
Frequency	3	5	5	7

   b) Find the standard deviation of the following data.
   10, 15, 25, 20, 30, 40, 50, 10
9. a) A contractor had to complete the work of a road in 16 days. He employed 30 persons for 12 days & complete 5/7 of the work. How many more persons should be employed how in order to complete the work in time?
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    $x - 2y + 3z = 10$
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No. of Students	3	5	6	8	4	4

    Find the quartile deviation.
15. Using 1st principle find derivative of $\frac{1}{\sqrt{4x+3}}$
16. If the revenue function is $R = Q - 3Q^2$ and cost function $C = Q^2 - 2Q$. Find the value of maximum profit.
17. A, B & C engage in a business with a joint capital of Rs. 18000. A gives Rs. 2000 more than B & B Rs. 2000 more than C. Divide a profit of Rs. 1080 among them.
18. A started business with a capital of 7000 in the beginning of the year. After 4 months he admitted B with a capital of Rs. 6000, after 6 months they admitted C with a capital of Rs. 8000. If the profit at the end of the year amounts to Rs. 15000, find their profits individually.

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