GLOBAL COLLEGE OF MANAGEMENT

Pre-Board Exam – 2070

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) Find the modulus of $\frac{(1+i)^3}{1-i^3}$

   (b) If $n(U)=300$, $n(A)=160$, $n(B)=180$, $n(A\cap B)=80$, find $n(A\cup B)$, $n(B-A)$ and $n(\overline{A\cup B})$.

2. (a) If the 5th term of a G.P. is 4 times 3rd term and the sum of the first 2 terms is – 4, find the series.

   (b) The sum of three numbers in A.P. is 21 and the sum of their squares in 179. Find the numbers.

3. (a) How many numbers between 100 and 1000 can be formed using the digits 3, 0, 4, 5, 6,7?

   (b) If $A=\begin{bmatrix}2 & -1\\ 3 & 2\end{bmatrix}$, $B=\begin{bmatrix}0 & 4\\ -1 & 7\end{bmatrix}$, find $3A^2+2B^2$.

4. (a) Find the ratio in which the join of the points (–2, 3) and (1, 2) is divided by the line $x+4y=3$.

   (b) Prove that the points (4, 3), (6, 4), (5, 6) and (3, 5) are vertices of a square.

5. (a) Using four figures log table, evaluate: $\sqrt[3]{\frac{12.7\times(0.86)^4}{(0.625)^3}}$

   (b) Prove that $\lim_{x\to 5}\left(\frac{1}{x-5}-\frac{25}{x^3-5x^2}\right)=\frac{2}{5}$

6. (a) Discuss the continuity or discontinuity of the function

$$f(x)=\begin{cases}\frac{x^2-x-6}{x-3} & \text{for } x\neq 3\\ 5 & \text{for } x=3\end{cases} \quad \text{at } x=3$$

   (b) Find $\frac{dy}{dx}$ if $y=\frac{1}{\sqrt{2x-a}+\sqrt{2x-b}}$

7. (a) Integrate: $\int\frac{x-\frac{7}{6}}{(3x^2-7x+5)^3}dx$

   (b) Find the total cost and average cost function when the marginal cost function for output x is $MC = 4 - 2x + 3x^2$.

8. (a) Find the coefficient of quartile deviation:

X:	10	12	15	18	20
f:	3	7	10	7	3

   (b) A card is drawn from a pack of 52 cards at random. What is the probability of getting an ace of spade?

9. (a) In a race of one kilometer, Mr. A beats Mr. B by 80 meters, Mr. B beats Mr. C by 70 meters, by how much does Mr. A beats Mr. C?

   (b) In how many years will a sum of money treble itself at 5% compound interest half yearly?

10. (a) The interest on a certain sum of money in 5years is Rs. 490 and the discount on the same sum, for the same time and the same rate is 440. Find the sum and rate.

(b) A man sells two articles at Rs. 1955 each. On one of them he gains 15% and on the other he losses 15%. Find the total gain or loss.

Group-B[8×5= 40]

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

12. Find the derivative from the definition: $\frac{1}{\sqrt{2x^2-3}}$

13. Use graphical method to solve the LP problems.
Find the extreme values of $G = 10x + 15y$ subject to the constraints
$x + 2y \le 20$; $x + y \le 16$, $x \ge 0$, $y \ge 0$.

14. Scorers of two golfers for 10 rounds are as follows.

A	74	75	78	78	72	77	78	79	81	76
B	86	84	80	88	89	85	86	82	82	79

Find which golfer may be considered to be more consistent player.

15. The demand equation for a certain commodity is
$P = \frac{Q^2}{3} - 10Q + 75$. Find the value of Q and the corresponding value of P that maximizes the revenue.

16. Alpha and Beta invested Rs. 40,000 and 25,000 in a firm. They agreed to receive 6% interest on their capitals out of the annual profit and the remaining profit is shared in the ratio of their capitals. If Alpha receives a total amount of Rs. 4544, find Beta's share.

17. It is profitable for Moscow merchant to buy a French draft in order to pay a debt of 15500 roubles, when 1 rouble = 2 Francs or to remit the amount through New York, the rate of exchange being 37 cents for 1 rouble and $1 for 5.27 francs?

18. Find the present value of an annuity of Rs. 400 for 10 years at 5% compound interest. Find the extra payment if it had been annuity due.

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Set B

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Group-A [10×2×3 = 60]

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

   (b) If $\cup = \{x : 4 \le x + 3 \le 13\}$, $A = \{x : x \ge 5\}$ and $B = \{x : x \le 8\}$, find : $A \cup B$, $A \cap B$, and $A - B$, x is an integer.

2. (a) If the 7th and 19th term of an A.P. are 62 and 2 respectively, find the first term and common difference and also form the series.

   (b) How many terms of the sequence 6, -12, 24, -48, . . . will have a sum -2046?

3. (a) There are 10 questions in an examination. In how many ways can be chosen 8 questions to answer. If question number 1 and 2 are compulsory, in how many ways can be chosen the 8 questions?

   (b) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -3 \\ 2 & -1 \end{bmatrix}$, verify $(AB)^T = B^T.A^T$.

4. (a) Find the intercepts on the axes made by the line $3x + 4y = 6$, also find the length of the portion intercepted between axes.

   (b) Find the equation of the line joining the point of intersection of the lines $x + 3y + 2 = 0$, $2x - y - 3 = 0$ to the point (3, 1).

5. (a) Using four figure log table evaluate: $\frac{(17.42)^{\frac{2}{3}} \times (18.42)}{\sqrt{126.37}}$

   (b) Evaluate: $\lim_{x \to 1} \frac{\sqrt{5+x} - \sqrt{8-2x}}{x^2 - 1}$

6. (a) Examine the continuity of the function: $f(x) = 3x^2 - 8x + 6$ at $x = 1$.

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

7. (a) Evaluate: $\int_0^2 \left(x - \frac{3}{4}\right)\left(2x^2 - 3x + 9\right)dx$

   (b) The marginal cost of production is found to be: MC = 2,000 – 40x + 3x^2, where x is the number of units produced. The fixed cost of production is Rs.18,000. Find the cost function. Also, calculate the average cost function.

8. (a) Find coefficient of the mean deviation from mean for the following data:
   20, 19, 20, 22, 22, 21, 23, 22, 24

   (b) In a company, out of 15 candidates 10 men and 5 women apply for two vacancies. What is the probability of selecting both women?

9. (a) A garrison of 120 men is provisioned for 24 weeks at the rate of 350 gms per day per man. How many men must leave so that the same provision may last those remain 30 weeks at 320 gms per day per man?

   (b) An article is sold for Rs. 500 at a gain. Had it been sold for Rs. 450 there would have been a loss equal to 50% of 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. 5,000 is accepted by a bank for Rs. 4,700 due 8 months?

(b) Batter is quoted at Rs. 255 per kg. or £4.06 per lbs. which is cheaper if £1=Rs. 25.40 and 1kg. = 2.2 lbs?

Group-B [8×5 = 40]

11. Prove that: $\begin{vmatrix} a & a^2 & ab+ac \\ b & b^2 & bc+ab \\ c & c^2 & ac+bc \end{vmatrix} = 0.$

12. Find the derivative from definition: $\frac{1}{\sqrt{2x+3}}$

13. Use graphical method to solve the LP problem:
Maximize (Z) = $x + y$, subject to the constraints:
$x+y \geq 3$, $2x+3y \leq 18$, $x \leq 6$ and $x, y \geq 0$.

14. From the following distribution, find the most appropriate measure of dispersion:

Wages	Below 25	25 – 29	30 – 34	35 – 39	40 & above
Frequency	5	12	22	25	17

15. X, Y and Z are partners with combined capital of Rs. 18,0000 in the ratio of 4:3:2. Each partner is paid interest at a rate of 8% on their capitals. Besides, Y receives 15% of his capital as fees for managing the firm and the remaining profits are divided in the ratio of their capitals. If the firm makes an annual profit at Rs. 54,000. What will be the payment that each partner receives?

16. Find the maximum and minimum values and point of inflection of $y = x^3 - 6x^2 + 9x - 2$.

17. Find the compound interest on Rs.6,900 for 3 years if the interest be payable half yearly and the rate of interest for the first 2 years being 6% per annum and for the third year 9% per annum.

18. Find the amount and present value of an immediate annuity of Rs. 2000 a year payable for 12 years at 4% p.a.