GLOBAL COLLEGE OF MANAGEMENT

Model Questions - 2077

Grade: XI **Subject: Business Mathematics (4051)** **F.M.:75**

Set I

Attempt **All** Questions:

Group-A [11x1=11]

Rewrite the correct option in your answer sheet

1. If the demand equation for a certain commodity is $Q = a - bP$, then the expression for elasticity of demand is

   a. $\frac{Q_d}{P}\frac{dP}{dQ_d}$ b) $\frac{Q_d}{P}\frac{dQ_d}{dP}$ c) $\frac{P}{Q_d}\frac{dQ_d}{dP}$ d) $\frac{P}{Q_d}\frac{dP}{dQ_d}$

2. The roots of $bx^2 + ax + c = 0$ are equal, if

   a. $a^2 - 4bc = 0$ b) $b^2 - 4ac = 0$

   c) $b^2 + 4ac = 0$ d) $c^2 - 4ab = 0$

3. If $\log_4 5 = a$, then log 2 is equal to

   a. $\frac{\log 5}{a} + 2$ b) $\frac{\log 5}{2a}$ c) $\frac{2\log 5}{a}$ d) $\frac{2a}{\log 5}$

4. If $y = x^n$, $n \neq 1$ *then* $\int x^n\,dx$ *is*

   a. $\frac{x^{n+1}}{n} + C$ b) $\frac{x^{n+1}}{n+1} + C$ c) $\frac{x^{n+1}}{n+1}$ d) $\frac{x^{n-1}}{n-1} + C$

5. If $x+2$, $3x$ *and* $4x+1$ are in A.P., then the value of x is

   a. 3 b) 2 c) 1 d) 4

6. If $f(x) = \begin{cases} \frac{x^2 - x}{2x} & for \quad x \neq 0 \\ k & for \quad x = 0 \end{cases}$

   and if f is continuous at $x = 0$, *then* $k =$

   a. -1 b) -1/2 c) 0 d) 1/2

7. If the true discount on a certain sum for 5 months at 12% p.a. is Rs.200, then the present worth is

   a. Rs.2000 b) Rs.3000 c) Rs.4000 d) Rs.5000

8. A began business with Rs.4200 and joined B with capital Rs.7200. When did B join if the profits at the end of the year are equally divided?

   a. 4 months b) 5 months c) 6 months d) 7 months

9. A manufacturer of radio sets produced 600 units in the third year and 700 units in the seventh year. Assuming the production uniformly increases by a fixed number every year, the production in the first year is

   a. 500 b) 530 c) 550 d) 570

10. If

Mark	Sita	Rita
Mean	70	75
Median	65	90

Who is intelligent?

a. Sita b) Rita c) Both of them d) None of above

11. How many numbers of 4 different digits can be formed from the digits 1, 2, 3, 4, 5, 6 and 7?

    a. 640 b) 740 c) 840 d) 940

Group-B

Attempt all questions **[8x5=40]**

12. The demand function for a good is P = 60 – 2Q. Fixed cost for a good is Rs.192 and the variable cost for each additional unit of good is Rs.20.
    a. Find total revenue and total cost function **[R = 60Q – 2Q², C = 192 + 20Q]**
    b. Find break even point. **[8, 12]**
    c. Find the profit function **[-2Q² + 40Q – 192]**
    d. Determine the maximum profit **[8]**
    e. Present the graph of profit function.

    [1+1+1+1+1]

13. The percentage, y of Europeans possing a mobile phone t years after, it was introduced is modeled by $y = 80 - 70\, e^{-0.2t}$
    a. Find the percentage of Europeans that have mobile phone (i) at the launch of product (ii) after 3 years **[10%, 41.58%]**
    b. What is the market saturation level? **[80%]**
    c. After how may years will the percentage of Europeans possing mobile first reach 75%. **[14 years]**

    [2+1+2]

14. Evaluate $\lim_{x\to\alpha} \dfrac{\sqrt{3a-x}-\sqrt{x+a}}{4(x-a)}$ **[Ans:** $-\dfrac{1}{4\sqrt{2a}}$ **]**

    Also find the following limits when they exist.

    $$f(x)=\begin{cases} x+4 & for \quad x>2 \\ 2x+2 & for \quad x<2 \end{cases} \quad at \ x=2$$ **[Ans: 6]**

    [3+2]

15. The demand function faced by a firm is P = 500 – 0.2Q and its cost function is C = 25Q + 10,000 (where Q =output or quantity). Find
    i) Marginal cost **[Ans: 25]**
    ii) Marginal revenue **[Ans: 500-0.4Q]**
    iii) Marginal profit. **[Ans: -0.4Q + 475]**

    [1+2+2]

16. Evaluate:
    a. $\int \dfrac{6x^2-6x+5}{\sqrt{2x^3-3x^2+5x-7}}\,dx$ **[Ans:** $2\sqrt{2x^3-3x^2+5x-7}+C$ **]**
    b. $\int x \ln x\, dx$ **[Ans:** $\dfrac{x^2}{2}\ln x-\dfrac{x^2}{4}+C$ **]**

    [2.5+2.5]

17. A small industry manufactures necklaces and bracelets. The combined number of necklaces and bracelets that it can handle per day is not more than 24. Each bracelet takes 1 hour of labour to make and each necklace takes a half hour. The total number of hours of labour available does not exceed 16. If the profit on the necklace is Rs.80 and the profit on the bracelet is 50. How many of each product should be produced daily to maximize profit? Solve the problem graphically. **[5]**

    [Ans: 8 and 16]

18. Calculate Q_1, D_6 and P_{76} for the following data: **[5]**

x:	5	4	9	12	15	6	10
y:	8	6	12	8	6	9	10

[Ans: Q_1 = 6, D_6 = 10, P_{76} = 45.6]

19. Following are the marks obtained by two students Ram and Hari in 10 tests of 100 marks each.

Test	1	2	3	4	5	6	7	8	9	10
Marks of Ram	54	60	56	68	72	52	48	76	80	44
Marks of Hari	66	57	51	72	69	63	60	54	75	48

Who has more consistent performance? **[5]**

[Ans: C.V of Ram = 19.18%, C.V of Hari = 14%,, Hari is cosistant]

Group-C

Attempt all questions **[8×3=24]**

20. a. Define derivative. Use it to find the derivatives of $\frac{3x+5}{\sqrt{x}}$. **[4]**

[Ans: $\frac{3}{2\sqrt{x}} - \frac{5}{2x^{3/2}}$ **]**

b. Find $\frac{dy}{dx}$ *when* $x^3 + y^3 = 3axy$ **[4]**

[Ans: $\frac{ay - x^2}{y^2 - ax}$ **]**

21. a. A, B and C have respectively Rs.50,000, Rs.35,0000 and Rs.25,000 invested in a business. A and B receive respectively 20% and 10% of the annual profits as salary. The residue of the profit is divided among them in proportion to their capitals. If at the end of the year A receives altogether Rs.1,200 more than B, what does each receive? **[4]**

[Ans: A = Rs.3181.4, B = Rs.1981.4, C = Rs.976.7]

b. The difference between the true and banker's discount on a certain bill due three months hence is Rs.5, the rate of interest being 4% p.a. Find true discount, banker's discount and amount of the bill. **[4]**

[Ans: T.D = Rs.500, B.D = Rs. 505, F.V = Rs.50,500]

22. a. A man has 10 friends of whom 6 are relatives. In how many ways can he invite 5 guests such that 2 of them may be relatives? **[4]**

[Ans: 60]

b. Ram and Shyam appear for an interview for two different posts. The probabilities of their selection are ¼ and 1/5 respectively. Find the probability that both of them will be selected, only one of them will be selected, and none of them will be selected. **[4]**

[Ans: 0.05, 0.35, 0.6]

*****The End*****

Set II

Attempt **All** Questions:

Group-A [11x1=11]

Rewrite the correct option in your answer sheet

1. If $f(x)=2x^2-3x+1$, then the value of $f(x+h)-f(x)$ is

   a. $4x+2h-3$ b) $4x+2h-3$ c) $2x+4h-3$ d) $2x+4h+3$

2. If the roots are equal for the quadratic equation $9x^2-kx+1=0$ then the value of k are

   a. ± 5 b) ± 6 c) ± 7 d) ± 8

3. If $5\log_5(x)-3\log_3(9)=2\log_5(x)$ then the value of (x) is

   a. 5 b) 15 c) 25 d) 35

4. The value of indefinite integral $\int \frac{x^2-4}{x-2}dx$ is

   a. $\frac{x^2}{2}+x+C$ b) $\frac{x^2}{3}-2x+C$

   c) x^2+2x+C d) $\frac{x^2}{2}+2x+C$

5. The sum of A.S. 6 + 10 + 14 + 18 +…… to 10 terms is

   a. 240 b) 340 c) 440 d) 540

6. If $\lim_{x\to a}\frac{x^2-a^2}{x-a}=4$. Then the value of a is

   a. 1 b) 2 c) 3 d) 4

7. Ram purchased goods worth Rs.2110 and agrees to pay it only after 4 months along with interest of 15% p.a. then the true discount is

   a. Rs.305.5 b) Rs.205.5 c) Rs.105.5 d) Rs.505.5

8. A, B and C are in partnership. Towards capitals, A contribute Rs.3600 and B Rs.3000. The profits amounted Rs.3000 out of which C receives Rs.1600. Then the capital of C in

   a. Rs.1600 b) Rs.2600 c) Rs.3600 d) Rs.4800

9. If CV of Ram's mark is greater than CV of Hari's mark. Who is more consistent of performance?

   a. Hari b) Ram c) both of them d) none of above

10. In how many ways can eight different beads be made into a bracelet?

    a. 1520 b) 2520 c) 3520 d) 4520

11. A card is drawn from 52 cards. Then the probability of getting king or spade is

    a. $\frac{4}{13}$ b) $\frac{8}{13}$ c) $\frac{16}{13}$ d) $\frac{2}{13}$

Group-B

Attempt all questions **[8x5=40]**

12. A book publisher finds that production cost associated with each book is Rs.30 and fixed cost is Rs.25,000. If each book is sold for Rs.50.
    a. Find the cost function and the profit function.
    b. If the publisher wants to make a profit of Rs.15,000 how many books should he sell?

    [3+2]

    [Ans: $C=30x+25{,}000$, $\pi=50x-25{,}000$, $x=2000$ **]**

13. On a college of 5000 students, one student returned from vacation with a contagious flu virus. The spread of the virus through the student population is given by $P = \frac{5000}{1+4999e^{-0.8t.}}, t \geq 0$

Where P is the total number of students infected after t days. The college will cancel classes when 40% or more of the students become infected.

a. How many students are infected after 5 days? **[Ans: 54]**

b. After how many days will the college cancel classes? **[Ans: 10]**

[2+3]

14. Discuss the continuity or discontinuity of the function

$$f(x) = \begin{cases} \frac{x^2 - 7x}{x-7} & for \quad x \neq 7 \\ 5 & for \quad x = 7 \end{cases} \quad at \ x = 7$$ **[discontinuous]**

and Evaluate: $\lim_{x \to 3} \left(\frac{1}{x-3} - \frac{6}{x^2-9}\right)$ **[Ans: 1/6]**

[3+2]

15. If R (Q) = Q^2 – 6Q +9 is a revenue function. Find demand and marginal revenue at production level 9. **[Ans: 4, 12]**

[2+3]

16. Evaluate:

a. $\int (3x^2 - 5)\,(x^3 - 5x + 6)^3\, dx.$ **[Ans:** $\frac{1}{4}(x^3 - 5x + 6)^4 + C$ **]**

b. Let the marginal cost function of a firm be $100 - 10x + 0.1x^2$ where x is the output. Obtain the total cost function of the firm under the assumption that its fixed cost in Rs.500.

[Ans: $100x - 5x^2 + \frac{1}{30}x^3 + 500$ **]**

[2+3]

17. Use graphical method to maximize and minimize $f(x, y) = 7x + 10y$ subject to constraints

$30x + y \leq 9, \quad x + 2y \leq 8, \quad x \geq 0, \quad y \geq 0$

[Ans: Max: 44 at (2, 3), Min: 0 at (0, 0]

[5]

18. Calculate Q_1, D_5 and P_{95} for the following data: **[5]**

x:	20	25	10	24	12	15	30	22
y:	20	5	9	8	8	15	3	10

[Ans: Q_1 = 15, D_5 = 15, P_{95} = 30]

19. From the data given below, find C.V

Variable	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	10	16	30	40	26	18

[5]

[Ans: 32.75%]

Group-C

Attempt all questions **[8×3=24]**

20. a. Find the derivative of $\sqrt{5x-7}$ from 1st principle. **[4]**

[Ans: $\frac{5}{2\sqrt{5x-7}}$ **]**

b. Find $\frac{dy}{dx}$

i) $x = 2at, \ y = at^2$ **[Ans: t]**

ii) $x + y = xy$ **[Ans:** $\frac{y-1}{1-x}$ **]**

[2+2]

21. a. A started 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 amount to Rs.15,000.. Find the profits individually. **[4]**

[Ans: Rs.7,000, Rs.4,000, Rs.4,000]

b. A bill was drawn for Rs.8000 and was discounted on Baniya Bank at 6% p.a. If the banker deducts Rs.24 as his interest, find for what time was the bill drawn? **[4]**

[Ans: 6 months]

22. a. There are 7 men and 3 ladies. Find the number of ways in which a committee of 6 persons can be formed if the committee is to have at least one man and exactly three ladies. **[4]**

[Ans: 203, 35]

b. Two fair dice are thrown at the same time. Find the probability that sum of two numbers turns up is (i) 6 (ii) less than 6 **[4]**

[Ans: (i) 5/36, (ii)5/18]

*****The End*****

Set III

Attempt **All** Questions:

Group-A [11x1=11]

Rewrite the correct option in your answer sheet

1. If $|2x-1|=3.$, then the values of x are

   a. $2 \text{ or } -1$ b) $2 \text{ or } -2$ c) $-1 \text{ or } 2$ d) $-2 \text{ or } -1$

2. If the roots of quadratic equations are 5 and 4. Then the equation of quadratic equation is

   a. $x^2+9x+20=0$ b) $x^2-9x+20=0$

   c) $x^2-9x-20=0$ d) $-x^2+9x+20=0$

3. If $2^{x+2}+3.2^x=112.$ Then the value of x is

   a. 2 b) 3 c) 4 d) 5

4. The value of $\int \log x.dx$ *is*

   a. $x^3 \log x+x+C$ b) $x^2 \log x+x+C$

   c) $\log x-x+C$ d) $x \log x-x+C$

5. If first term of A.P is 8 and common difference in 3. Then t_{31} is

   a. 98 b) 88 c) 78 d) 68

6. The value of $\lim_{x\to\infty} \frac{5x^2+7x+8}{5x^2+3x-3}$ *is*

   a. 0 b) 1 c) 5/3 d) 5

7. Find banker's discount on Rs. 2100 due 6 months hence at 4% p.a. simple interest.

   a. Rs. 22 b) Rs.32 c) Rs.42 d) Rs.52

8. If A, B and C invest Rs.1000, Rs.1100 and Rs.1400 respectively. Then divide a profit of Rs.980 among A, B and C.

   a. Rs.100, Rs.250, Rs.350 b) Rs.200, Rs.300, Rs.400

   c) Rs.300, Rs.400, Rs.500 d) Rs.480, Rs.300, Rs.200

9. The mark of 10 students are 19, 91, 25, 55, 63, 74, 89, 47, 39, 57, then the median mark is

   a. 56 b) 55 c) 47 d) 39

10. If ${}^nP_3 : {}^nP_2 = 3:1$. Then the value of n is

    a. 4 b) 5 c) 6 d) 8

11. Two fair coins are tossed at the same time, then the probability of getting at least one head is

    b. $\frac{1}{2}$ b) $\frac{1}{4}$ c) $\frac{3}{4}$ d) $\frac{4}{3}$

Group-B

Attempt all questions **[8x5=40]**

12. The demand of calculators when its price per unit is Rs.1200, is Rs.4000. When the price increases to Rs.1500, only 3000 calculators are demanded.

    a. find the demand equation in the form of $p = f(Q)$ **[3]**

    b. obtain the number of calculations demanded when the price per unit calculators is Rs.1650. **[1]**

    c. If 4500 calculations are demanded, what should be the price per unit of calculator? **[1]**

    [Ans: P = 2400 – 0.3Q, 2500, Rs.1050 **]**

13. a. Form the quadratic equation whose one root is $5+\sqrt{6}.$ **[2]**

    b. Solve $x^2-x-6 \geq 0$, Present the solution set in number line. **[3]**

    [Ans: $x^2-10x+9=0, \quad (-\infty,-2] \text{ and } [3,\infty)$**]**

14. a. A function is defined as follows:

$$f(x)=\begin{cases}3+2x & for \quad -\frac{3}{2}\le x<0\\ 3-2x & for \quad 0\le x<3/2\\ -3-2x & for \quad x\ge 3/2\end{cases}$$

Test the continuity or discontinuity at x = 3/2 **[3]**

[Ans: discontinuous]

b. Evaluate: $\lim_{x\to 4}\dfrac{x^2-16}{\sqrt{3x+4}-4}$ **[2]**

[Ans: 64/3]

15. The cost function of a product is C (Q) = $3Q^2$ + 8 and the demand function of the same product is $P=\frac{1}{3}Q^2-10Q+105,$ Where Q is the output, P the price per unit output.

(i) find the marginal cost when output is 4. **[2]**

(ii) find the marginal profit at the output level 4. **[3]**

[Ans: (i) 24, (ii) 17]

16. a. Integrate: $\int\dfrac{x+2}{2x-5}dx$ **[2]**

[Ans: $\frac{1}{4}x+\frac{9}{4}\log(2x-5)+C$ **]**

b. If the marginal revenue function for output x is given by $M_R=3x^2+2x+5$. Find the total revenue function. Also, deduce the demand function. **[3]**

[Ans: $x^3+x^2+5x,\quad x^2+x+5$**]**

17. Use graphical method , solve the given linear programming problems

Minimize $z=x+y,$ subject to constraints

$3x+2y\ge 12,\quad x+3y\ge 9,\quad x\ge 0,\quad y\ge 0$ **[5]**

[Ans: Min: 33/7: at (18/9, 15/7)]

18. Find the median and mode from the following data: **[5]**

Wages (in Rs.)	10-19	20-29	30-39	40-49	50-59	60-69	70-79
No. of workers	7	15	10	20	25	3	10

[Ans: Median = 46, Mode = 51.35]

19. Find M.D from mean and coefficient of M.D from mean from the following distribution.

Class	0-20	20-40	40-50	50-60	60-80
Frequency	4	6	10	8	2

[4+1]

[Ans: M.D. from mean = 13.11, coefficient = 0.3146]

Group-C

Attempt all questions **[8×3=24]**

20. a. Find the derivative of $5x^2-7x+8$ from definition. **[5]**

[Ans: $10x-7$ **]**

b. Find $\dfrac{dy}{dx}\quad y=\dfrac{1}{\sqrt{x+a}-\sqrt{x-b}}$ **[3]**

[Ans: [$\dfrac{1}{2(a+b)}\left(\dfrac{1}{\sqrt{x+a}}+\dfrac{1}{\sqrt{x-b}}\right)$ **]**

21. a. A and B were equal partners in manufacturing concern C was admitted as a new partner to whom A agreed to give up $\frac{2}{19}$ of his share and B, $\frac{3}{19}$ of his share. When the profits were divided, C. got Rs.1690. How much did A and B receive? **[4]**

[Ans: A = Rs.5746, B = Rs.5408]

b. The interest on a certain sum is Rs.336 and the discount for the same time at the same rate is Rs.300. Find the sum and banker's gain. **[4]**

[Ans: F.V = Rs.2800, B.G. = Rs.36]

22. a. In how many ways can a committee of 4 persons be selected out of 10 persons? So that two particular persons may (i) always be taken (ii) never be taken **[2+2]**

[Ans: (i) 28 (ii) 70]

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

(i) both men **[2]**

(ii) a men and a woman **[2]**

[Ans: (i) 9/21, (ii) 10/21]

*****The End*****