

Questions Patt



National University

Bachelor of Honours Courses

According to new curriculum (Grading & Credit System)

(Questions will be set from recommended textbooks)

Distribution of Marks in Question Paper

Effective from: Session 2009-2010

For 1st & 2nd Year Honours Course

Full Marks: 100

Time of Examination: 4 Hours

Question Types		Details	Marks
Part-A	Brief Questions (such as definition/ Quizzes) (Covering all the chapters of the syllabus.)	20 questions out of 24 such as question number 1. (a) – (x)	(20×1)=20
Part-B	Short Questions (such as Conceptual/Numerical) (Covering all the chapters of the syllabus.)	5 Questions Out of 8 Question will be divided into 2 parts, such as question 2.(A) & (B).	5X(4+4) =40
Part-C	Broad Questions (such as Analytical/Conceptual/Numerical)	4 Questions Out of 7 (Question may be divided into 10. (i), (ii), (iii) etc subsections.) For mathematical/numerical questions this condition may be relaxed	(4×10)=40
		Total	100

Part-B
Short Questions

Answer any 5(five) Questions from the following:

5×(4+4)=40

2. (A) Prove that $\sqrt{3}$ is a irrational number.
 (B) Find the sum to n terms of the series. $1.4 + 3.7 + 5.10 + \dots$
3. (A) Prove that $7 \log \frac{16}{15} + 5 \log \frac{25}{24} + 3 \log \frac{81}{80} + \log \frac{1}{2} = 0$
 (B) Prove that $(A \cup B)' = A' \cap B'$
4. (A) Find the equation of the straight line through (2,5) and making equal intercepts of the opposite sign on the axis.
 (B) Mr. Irtiza saved Tk 16,500 in 10 years. In each year of ten the first. He saved Tk. 100 more than he did in the preceding year. How much did he save in the first year?
5. (A) Solve the equation: $\frac{x-bc}{b+c} + \frac{x-ca}{c+a} + \frac{x-ab}{a+b} = a+b+c$
 (B) By selling a table for Tk. 56, gain is as much percent as it cost in Taka's. What is the cost price of the table?
6. (A) Find the 19th term of $\left(2x^{\frac{1}{2}} - y^{\frac{1}{3}}\right)^{20}$
 (B) Prove that ${}^{n+1}C_r = {}^n C_r + {}^n C_{r-1}$
7. (A) Calculate effective rate of interest for Tk. 1000 invested for 5 years at 8% interest compounded Quarterly.
 (B) Show that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ bc & ca & ab \end{vmatrix} = (a-b)(b-c)(c-a)$
8. (A) Find $\frac{dy}{dx}$ if $y = x^{x^x}$
 (B) Integrate the following $\int \frac{x^3 dx}{(x^2+1)^3}$.
9. (A) If $A = \{1,2,3\}$, $B = \{2,3,4\}$, $C = \{4,5,6\}$ are the subset of the universal set $Q = \{1,2,3,4,5,6,7,8\}$ Find $(A \Delta B) \Delta C$
 (B) If $A = \begin{pmatrix} 1 & -1 \\ 2 & -1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 1 \\ 4 & -1 \end{pmatrix}$ then show that $(A+B)^2 = A^2 + B^2$.

Part-C
Broad Question

Answer any 4 (Four) questions from the following

4×10=40

10. In a survey of college students it was found that 40% use their own book, 50% use library books; 30% use borrowed books; 20% use both their own book and library books; 15% use their own books and borrowed books; 10% use library books and borrowed books and 4% use their own book, library books and borrowed books. Calculate.

- i) What percentage of students do not use a book at all? 2.5
 ii) What percentage use only two books? 2.5
 iii) What percentage use only one books? 2.5
 iv) What percentage use two consecutive books? 2.5
11. The cost of producing 200 pins is Tk. 1000 and the cost of producing 400 pens is Tk. 1500.
- i) Find the linear relationship between the cost y of producing x pens. 3
 ii) What number of pens must be produced and sold at Tk. 3 per pen, so that there is neither profit nor loss? 3
 iii) What should be the selling price of a pen if 600 pens are produced and sold with a profit of Tk. 400. 4

12. Let the cost function of a firm be given by the following equation $c = 300x - 10x^2 + \frac{1}{3}x^3$, where c stands for cost and x for output. Calculate:
- i) Output at which marginal cost is minimum 3
 ii) Output at which average cost is minimum 3
 iii) Output at which average cost is equal to marginal cost. 4

13. A manufacturer produces three products P, Q and R which he sells into markets. Annual sales values are indicated as follows:

Products	P	Q	R
Markets			
I	10,000	2,000	18,000

- i) If unit sale prices of P, Q, R are Tk. 2.50, 1.25 and 1.50 respectively find the total revenue in each market with the help of Matrix Algebra. 5
 ii) If the unit casts of the above 3 commodities are Tk. 1.80, 1.20 and 0.80 respectively, find his gross profit. 5
14. The staff of a bank consists of the Manager, the deputy manager and 10 other officers. A committee of 4 is to be selected. Find the number of ways in which this can be done so as to always include—
- i) The manager 3
 ii) The manager but not the deputy manager 3
 iii) Neither the manager nor the deputy manager. 4
15. i) If $m = a^x, n = a^y$ and $(m^y \cdot n^x)^z = a^2$ then show that $xyz = 1$ 5
 ii) If $x = \log_{2a} a, y = \log_{3a} 2a, z = \log_{4a} 3a$ then prove that $xyz + 1 = 2yz$. 5
16. i) Mr. Towhid borrowed Tk. 25,000 from a money-lender but he could not repay any amount in a period of 5 years. Accordingly the money lender demands now Tk. 35,880 from him. At what rate percent per annum compound interest did the latter lend his money. 5
 ii) Mr. Arnob borrows Tk. 20,000 at 4% C.I. and agrees to pay both the principal and the interest in 10 equal installments at the end of each year. Find the amount of each installment. 5

[All questions are set from the recommended syllabus & Topics]

B.B.A (PART-1) FIRST SEMESTER EXAMINATION-2004 (Professional)

Subject Code: 1104; Business Mathematics

Group A ; Answer any four questions

1. If A, B be any two sets, then prove: $A \cup B = (A - B) \cup B$. 5
2. Differentiate with respect to x : 5
 - (i) $y = (3x^3 - 5x^2 + 8)^3$; (ii) $y = \sqrt{3x^2 - 7}$
3. If $f(x) = ax^2 + bx + c$ and $f(x) = 6$, $f(2) = 11$, $f(3) = 18$; find the values of a, b and c . Hence find $f(-1)$.
4. By selling a table for Tk.75, gain is as much percent as its cost. What is the cost? 5
5. Express y in terms of x if $3 \log_{10}(x^2 y) = 1 + 2 \log_{10} x - \log_{10} y$, x and y are positive. 5
Also find the values of x and y where $x - y = 2\sqrt{6}$.
6. An estate valued at Tk.12,000 is divided among three persons A, B and C. If A surrenders 15 percent of his shares, then shares of B and C are respectively increased by 10 percent and 25 percent. Again if A surrenders 20 percent, then shares of B and C are respectively increased by 15 percent and 30 percent. Find the shares of each. 5

Group B (Answer any four questions)

7. (a) Find the compound interest rate on Tk.10,000 for 4 years at 5% per annum. What will be the simple interest rate in the above case? 2
- (b) A man borrows Tk.6,000 at 6% and promises to pay off the loan in 20 annual payments beginning at the end of the first year. What is the annual payment necessary? 3
- (c) A machine costs a company Tk.90,000 and its effective life is estimated to be 12 years. If the scrap realizes Tk.2,000 only, what amount should be retained out of profit at the end of each year to accumulate at compound interest at 5% per annum? 5
8. (a) There are 8 vacant chairs in a room. In how many ways can 5 persons take their seats? 3
- (b) In how many ways 10 examination papers be arranged so that the best and the worst papers never come together? 3
- (c) In how many ways can 7 Bangladeshis and 6 Indians sit down a round table so that no 2 Bangladeshis sit together? 4
9. (a) A company has examined the cost and revenue structure and has determined that C the total cost, R total revenue and x the number of units produced are related as: $C = 100 + 0.015x^2$ and $R = 3x$. Find the production rate x that will maximize profits of the company. Find the profit. 5
- (b) Integrate the following functions with respect to x : 5
 - (i) $\int \frac{x^2}{(x^3 + 2)^{1/4}} dx$; (ii) $\int (x^2 + 2)^{1/2} \cdot x^3 dx$ 5
10. (a) Solve the equation: $\sqrt{\frac{x}{x+16}} + \sqrt{\frac{x+16}{x}} = \frac{25}{12}$ 5
- (b) Demand and supply curves of a firm are related by the equations: $p^2 + q^2 = 29$, $p - q = 3$ Find the equilibrium price and quantity. 5
11. (a) Distinguish between equal sets and equivalence sets. 4
- (b) Out of the total 150 students who appeared for BBA Examination from a college, 45 failed in Accounting, 50 failed in Business Mathematics and 30 failed in Statistics. Those who failed both in Accounting and Business Mathematics were 30, and those who failed both in Accounting and statistics were 35. The students who failed in all the subjects were 25. Find out the number who failed at least any one of the subjects. 6
12. (a) Evaluate the integral $\int_{-1}^1 (3x^2 - 7x^3) dx$ 4
- (b) Determine consumer's surplus and producer's surplus for the demand function $p = 36 - x^2$ and supply function $p = 6 + \frac{x^2}{4}$, where p is price and x is quantity.

B.B.A (PART-1) FIRST SEMESTER EXAMINATION-2005 (Professional)

(According to New Syllabus)

Subject Code: 1104

Business Mathematics

[N.B. Figures in the right margin indicate full marks. Answer all questions from Part-I, four from Part-II and four from Part-III.]

Part-I

1. Choose the correct answer: 10×1 = 10
- (a) Which one is prime number?
 i. 1, ii. 2, iii. 4, iv. 6
- (b) Which one is not true?
 i. $A \cup \phi = A$, ii. $A \cap \phi = \phi$, iii. $A \cap U = U$, iv. $A \cup U = U$
- (c) When two odd numbers are added, we get a:
 i. Odd number ii. Prans number iii. Even number iv. Zeor
- (d) The number of roots of the quadratic equation are:
 i. One ii. two iii. Three iv. four
- (e) The slope of the line $3x + 2y = 5$ is:
 i. $-\frac{3}{2}$ ii. $\frac{3}{2}$ iii. $-\frac{2}{3}$ iv. $\frac{2}{3}$
- (f) If $\log_2 x = 3$ then the value of x :
 i. 2 ii. 4 iii. 6 iv. 8
- (g) If $\log_x 32 = 5$ then the value of x :
 i. 2 ii. 3 iii. 4 iv. 5
- (h) If $y = \sqrt{x}$ then $\frac{dy}{dx}$ is:
 i. $2\sqrt{x}$ ii. $\frac{1}{\sqrt{x}}$ iii. $\frac{1}{2\sqrt{x}}$ iv. $\frac{2}{\sqrt{x}}$
- (i) The value of $\int_{-1}^1 x dx$ is:
 i. 0 ii. 1 iii. 2 iv. 3
- (j) The value of $\sqrt[6]{64}$ is:
 i. 2 ii. 4 iii. 6 iv. 8

Part-II

2. Calculate the effective rate of interest for Tk.1,000 invested for 5 years at 8 percent interest compounded quarterly. 5
3. If $f(x) = 2x^2 - 5x + 4$, find the values of x for which $f(2x) = 2f(x)$. 5
4. If $A = \{1,4\}, B = \{2,3\}, C = \{3,5\}$, prove that $A \times B \neq B \times A$. Also find $(A \times B) \cap (A \times C)$. 5
5. Find the maximum or minimum value of $2x^3 - 15x^2 + 36x + 12$. 5
6. Prove that $\sqrt{2}$ is an irrational number. 5

Part-III

7. (a) Solve the equation: $x + \sqrt{x} = \frac{6}{25}$ 5
- (b) The demand and supply equations are $2p^2 + q^2 = 11$ and $p + 2q = 7$. Find the equilibrium price and quantity, where p stands for price and q for quantity.
8. (a) Find the equation of a straight line which has y -intercept equal to 3 and is perpendicular to the line $2x + 3y + 5 = 0$. 5
- (b) A firm produces 20 units of an item for Tk.73 and 50 units for Tk.97. Assuming the cost function to be linear, find the equation of this line and use it to estimate the cost of producing 40 units. 5
9. (a) Integrate the following functions with respect to x : 5
- (i) $\sqrt{x} - \frac{1}{\sqrt{x}}$; (ii) $x^2(x^3 + 2)^{1/2}$
- (b) The demand and supply functions under perfect competition are $y = 16 - x^2$ and $y = 2x^2 + 4$ respectively. Find the market price, consumer's surplus and producer's surplus. 5
10. (a) Discuss the methods of describing of a set.
- (b) Out of 2,000 employees in a office it was found that 48% preferred coffee (C), 54% liked tea (T) and 64% used to smoke (S) of the total 28% used C and T, 32% used T and S, 30% preferred C and S. Only 6% did one of these. Find (i) the number having all the three (ii) T and S but not C (iii) Only C.
11. (a) Find the derivative with respect to x :
- (i) $y = \sqrt{5x^2 + 4x + 2}$; (ii) $y = \sqrt{x} + 3x^2 + 5x$
- (b) The cost of manufacturing a certain article is given by the formula $C = 5 + \frac{48}{x} + 3x^2$, whose x is the number of articles manufactured. Find the minimum value of C .
12. (a) Distinguish between simple interest and compound interest.
- (b) A man borrows Tk.750 from a money lender and the bill is renewed after every half year at an increase of 21%. What time will elapse before it reaches Tk.7500?

National University
B.B.A (PART-1) FIRST SEMESTER EXAMINATION-2006 (Professional)

(According to New Syllabus)

Subject Code: 1104

Business Mathematics

[N.B. Figures in the right margin indicate full marks. Answer all questions from Part-I, four from Part-II and four from Part-III.]

Part-I

1. Choose the correct answer:

10×1 = 10

(a) The line $3x - 7y = 10$ meets y -axis at the points

- i. $\left(\frac{10}{3}, 3\right)$ ii. $\left(0, -\frac{10}{7}\right)$ iii. $\left(0, \frac{10}{3}\right)$ iv. $\left(-\frac{10}{7}, 0\right)$

(b) The value of x satisfying $\log 32x = 0.8$ is

- i. 25.6 ii. 16 iii. 10 iv. 12.8

(c) The difference between the interests received from two different banks on Tk.500 for 2 years, is Tk.2.50. The difference between their rates is

- i. 1% ii. 0.5% iii. 2.5% iv. 0.25%

(d) A man sold his cow for Tk.7,920 and gained 10%. The cow was bought for

- i. Tk.7,200 ii. Tk.7,128, iii. Tk.8,712 iv. Tk.7,810.80

(e) Which of the following is a true statement?

- i. Every real number is rational
 ii. Every real number is irrational
 iii. Every complex number is real
 iv. Every natural number is real

(f) Which one is Irrational number?

- i. $\sqrt{3}$ ii. $\sqrt{4}$ iii. $\sqrt{9}$ iv. 10

(g) Which is true?

- i. $(A \cup B)' = A' \cup B'$ ii. $A \cap (B - C) = (A' \cap B) \cup C$
 iii. $(A \cap B)' = A' \cup B'$ iv. $A \cap (B - A) = U$

(h) An integer is said to be even if it is

- i. Divisible by 2 ii. Divisible by 3
 iii. Divisible by $\sqrt{3}$ iv. Divisible by π

(i) The number of roots of the quadratic equation are

- i. One ii. Two iii. Four iv. Five

(j) Which one is quadratic equation?

- i. $ax^2 + bx + c = 0$ ii. $5x - 3y + 1 = 0$
 iii. $ax = 0$ iv. $\frac{x}{3} + \frac{y}{5} = 0$

Part-II

2. A certain amount of money was invested at 8% simple interest and after 9 month an equal amount was invested at 10% simple interest. Find the period of which the amount in each case becomes Tk.2,600. How much money was invested in each case? 5
3. A firm has determined that the total revenue R in taka from the sales of ' q ' units of product is $R = f(q) = 12q$. 5

- i. What will be the total revenue generated by the sales of 800 units of product?
 ii. How many units must be sold in order to generate Tk.24,000 in revenue?
4. If $A = \{4, 6, 8, 10\}$, $B = \{6, 7, 8, 9\}$ and $C = \{x; x \in \mathbb{N}, 3 \leq x \leq 7\}$. Find 5
 Find (i) $A-B$, (ii) $B-C$, (iii) $A-(B-C)$, (iv) $(A \cup B) \cap C$, (v) $A - (B \cap C)$
5. If one root of the equation $ax^2 + bx + c = 0$ is the square of the reciprocal of the other 5
 then prove that $a^3 + c^3 + abc = 0$
6. A firm produces 20 units of an item for Tk.73 and 50 units for Tk.97. Assuming the cost 5
 function to be linear, find the equation of this line and use it to estimate the cost of producing 40 units.
7. For any two sets A and B , then prove that $(A \cup B)' = A' \cap B'$. 5
8. a. In a store 240 units of a particular item are stocked at the beginning of each month. If 5
 the sales of such an item average 12 units per sales day find:
 i. The function which gives the number of units in stock at any given sales day during each month assuming linearly.
 ii. In how many days would the store run out of stock?
- b. If 7% of the sales price of an article is equivalent of 8% of its cost price and 9% of the 5
 sales price exceeds 10% of the cost price by Tk.1; find the amount of profit and the cost price of it.
9. a. The relation between total cost y and total sales x is related by the equation, 5
 $y = 0.31x + 24,000$. Find the:
 i. Total variable cost if sales is Tk.35,000
 ii. Break-even point.
- b. The intercepts made by a straight line on the x and y axes are -3 and 2 units. Find 5
 i. The gradient of the line
 ii. The equation of line.
10. a. If $\log(xy) = x^2 + y^2$, find $\frac{dy}{dx}$? 5
- b. Assume that is a market under pure competition the supply function for a certain item 5
 is given by $g(x) = 3x + 3$; while the demand function for the same item is given
 $y f(x) = 13 - x^2$. Determine the price at which the item would be sold and the consumer's and producer's surplus.
11. a. Solve the equation: $ax^2 + bx + c = 0$ 5
- b. Prove that: $\frac{\log \sqrt{27} - \log 8 + \log \sqrt{1000}}{\log 120} = \frac{3}{2}$ 5
12. a. Establish the straight line with the slope and an intercept on y -axis. 5
- b. If total factory cost y of making x units of a product is $y = 3x + 20$ and if 50 units 5
 are produced.
 i. What is the variable cost?
 ii. What is the total cost?
 iii. What is the variable cost per unit?
 iv. What is the average cost per unit?
13. a. Establish $\frac{dy}{dx}$ of the curve $y = f(x)$ with the tangent and the limit. 5
- b. Find the derivative with respect to x 5
 i. $y = 3\sqrt{5x^2 + 4x + 2}$ ii. $y = \frac{ax^2 + bx}{(ax + b)^2}$

Part-II

2. The cost of manufacturing of a commodity consists of Tk.3,400 fixed and Tk.17 per unit variable cost. If the selling price of the commodity is 34 per unit find:
- (i) The total cost function; (ii) The total profit function.
 (iii) The profit function.
3. (a) What is the Slope of straight line?
 (b) Show that the triangle whose vertices are (2,1), (0,3) and (-2,1) is an isosceles triangle. Find also the altitude of this triangle.
4. Find the maximum and minimum values of the function, $x^3 - 2x^2 - 4x - 1$.
5. Solve the equation: $\sqrt{3x^2 + 5x + 6} + \sqrt{3x^2 + 5x - 9} = 5$
6. A machine is depreciated in such a way what the value of the machine at the end of any year is 90% of the value at the beginning of the year. The cost of the machine was Tk.1,20,000 and it was sold eventually as waste metal for Tk.2,000. Find out the number of years during which the machine was in use.
7. The cost function for growing corn on a plot of land is, $C(x) = x^2 + 100x + 900$, Where x is the amount of corn, measured in thousands of bushels. How much corn should be grown in order to minimize the average cost of a bushel?

Part-III

8. (a) Find the derivative with respect to x :
- (i) $\frac{1}{\sqrt{2x^4 + 3x^3 - 5x + 6}}$; (ii) x^{-x^2}
- (b) A company finds that it can sell out a certain product that it produces, at the rate of Tk.2 per unit. It estimates the cost function of the product to be $\text{Tk.} \left[1000 + \frac{1}{2} \left(\frac{1}{50} \right)^2 \right]$ for q units produced;
- i. Find the expression for the total profit if q units are produced and sold.
 ii. Find the number of units produced that will maximize profit;
 iii. What is the amount of this maximize profit?
 iv. What would be the profit if 6,000 units are produced?
9. (a) Demand for goods of an industry is given by the equation $pq = 100$, where p is price and q is quantity and supply is given by the equation $20 + 3p = q$. Find the equilibrium price and quantity.
- (b) Find the equation to the straight line passing through the point (3,1) and is:
 i. Parallel as well as;
 ii. Perpendicular to the line $2x + 7y - 5 = 0$.
10. (a) As the number of units produced increases from 1,000 to 1,500, the total cost of production increases from Tk.9,000 to Tk.11,500. Find the equation of the cost curve, assuming it to be a straight line. what is the slope of the line and what does it indicate? Also find the cost of 1,200 units.
- (b) A business man agrees to pay a debt of Tk.20,000 with 10% compound interest. After how many years he will pay a total amount of tk.51,874.85 with interest?

11. (a) The total monthly variable cost of x to n output by a firm producing metal is Tk. $\frac{1}{10}x^3 - 3x^2 + 5x$ and the fixed cost is Tk.300 per month. Find the output for minimum average cost.
- (b) A company is produced by using 3 units of labour and 2 units of capital. The total cost comes to 62. If the commodity is produced by using 4 units of labor and 1 unit of capital, the total cost comes to 56. What is the cost per unit of labor and capital?
12. (a) If A,B,C be any three sets, then prove that $A \times (B \cup C) = (A \times B) \cup (A \times C)$
- (b) If $A = \{1,2,3,4\}$, $B = \{2,4,6\}$, $C = \{1,2,5\}$, $D = \{7\}$ and $U = \{1,2,3,4,5,6,7,8\}$ compute $(A' - B') \times (B - C)'$.
13. (a) Determine the following integral w, r, x : $\int_2^5 \frac{3x}{(x+1)^2} dx$
- (b) The marginal cost of production is found to be, $MC = 2000 - 40x + 3x^2$. Where x is the number of units produced. The fixed cost of production is Tk.18,000. Find the cost function.
If the manufacturer fixes the price per unit at Tk.6800.
- Find the revenue function
 - Find the profit function
 - Find the sales volume that yields maximum profit.

B.B.A (PART-1) FIRST SEMESTER EXAMINATION-2008 (Professional)

(According to New Syllabus)

Subject Code: 1104 Examination Code-601

Business Mathematics

Time-3 hours, Full marks-70

[N.B. Figures in the right margin indicate full marks. All parts of a question must be answered sequentially.]

Part-A

(Answer any five questions)

Marks-6×5 = 30

1. (a) Let the function $f : R \rightarrow R$ defined by—

$$f(x) = \begin{cases} = 4x - 1 & \text{if } x > 3 \\ = x^2 + 4 & \text{if } -2 \leq x \leq 3 \\ = 3x + 2 & \text{if } x < -2 \end{cases}$$
 Find: i. $f(1)$ ii. $f(-2)$ iii. $f(4)$
- (b) Suppose the selling price of a commodity is Tk.40 per item. If fixed costs are Tk.200 and the variable cost amount to Tk.20 per item, find—
 - (i) The total revenue function;
 - (ii) The total cost function.
 - (iii) The profit function.
2. A. P. C is purchased on installment basis, such that Tk.5,000 is to be paid on the signing of the contract and four yearly installment of Tk.3,000 each payable at the end of the first, second third and fourth year. If interest were charged at 5% per annum, what would be the cash down price?
3. Mr. Hafiz borrowed Tk.20,000 from a moneylender but he could not repay any amount in a period of 4 years. Accordingly the moneylender demands now Tk.26,500 from him. At what per cent compound interest rate per annum did the lender lend his money?
4. A company has examined its cost and revenue structure and has determined that C is the total cost, R is the total revenue and x is the number of units produced and they are related as $C = 100 + 0.015x^2$ & $R = 3x$ Find the production rate x that will maximize the profit of the company. Find that profit. find also the profit when $x = 240$.
5. Demand for the product of a firm is given by $q = 220 - 5p$, where p is price and q stands for quantity of demand & supply. Supply function is given as $q = -20 + 3p$. Find the equilibrium price & quantity.
6. A firm invested 10 million in a new factory that has a net return of Tk.5000,000 per year. An investment of Tk.20 million would yield a net return of Tk.2 million per year. What is the linear relationship between investment and annual return? What would be the annual return on investment of Tk.15 million?
7. Given the demand function $p = 45 - 0.5q$. Find the consumer's surplus (CS) when price is 32.5 and quantity is 25. Given the supply function $P = (Q + 3)^2$, find the producers surplus PS, when price is 81 and quantity is 6.

Part-B

(Answer any five questions)

Marks-10×4 = 40

8. Out of 880 boys in a school, 224 played cricket, 240 played hockey and 336 played basketball; of the total boys 64 played both basket ball and hockey; 80 played both cricket and basketball; 40 played cricket and hockey; 24 boys played all the three games. How many boys did not play any game and how many played only one game?
9. (a) If $A = \{3,5,7,9\}$, $B = \{5,6,7,8\}$ and $C = \{x; x \in N, 2 \leq x \leq 6\}$
- i. $A - B$ ii. $B - C$ iii. $A - (B - C)$
- iv. $(A \cup B) \cap C$ v. $A - (B \cap C)$
- (b) Sketch the following functions:
10. (a) A limited company intends to create a depreciation fund to replace at the end of the 25th year assets costing Tk.1,00,000. Calculate the amount to be retained out of profit year if the interest rate is 3%.
- (b) If 7% of the sales price of an article is equivalent to 8% of its cost price and 9% of the sales price exceeds the 10% of the cost price by Tk.1; find the amount of profit and the cost price of it.
11. (a) The demand function faced by a firm is $P = 500 - 0.2x$ and its cost function is $C = 25x + 10,000$, ($P =$ price, $x =$ output, $C =$ cost). Find the output at which the profits of the firm are maximum. Also find the price it will charge.
- (b) The total expenses of a mess y , are partly constant and partly proportional to the number of inmates of the mess x . The total expenses are Tk.1040 when there are 12 members in the mess and Tk.1600 for 20 members.
- i. Find the relationship between x and y
- ii. Find the constant expenses per member
- iii. What would be the total expenses if the mess has 15 members?
12. (a) In a perfect competition, the demand curve of a commodity is $D = 20 - 3p - p^2$ and the supply curve is $S = 5p - 1$, where P is price, D is demand and S is supply. Find the equilibrium price and quantity.
- (b) Keya Company has two types of soaps. The price of one kind is Tk.9 and the price of another kind is Tk.8. The Company sold for Tk.9,300. But due to increase in cost of production, the price of first kind of soap will be increased by Tk.1 and other kind's price by Tk.1.5. Then total sales of soap will be 10,700. Find out the number of each kind of soap sold.
13. (a) A company studies the product preferences of consumers. It was found that, 70% consumers like fizz Up, 60% like Sprite, 50% Uro Cola, 40% like Fizz Up and Sprite, 30% like Sprite and Uro Cola, 20% like Fizz Up and Uro Cola, 10% like all and 10% like none. Prove that the study results are not correct.
14. (b) In a recent survey of 200 women, the following information is found: 122 use Sunsilk shampoo, 98 use All Clear shampoo, 74 use Meril shampoo, 52 use Sunsilk and All clear shampoo, 42 use Sunsilk and Meril shampoo, 34 use all clear and Meril shampoo and 26 use all the three.
- i. How many does not use any of these?
- ii. How many women use only sunsilk Shampoo?

TABLE-I

Future value interest factor of \$1 at $i\%$ at the end of n periods ($FVIF_{i,n}$), $(FVIF_{i,n})=(1+i)^n$

PERIOD	INTEREST RATE (i)												PERIOD
(n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	(n)
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.100	1.120	1
2	1.020	1.040	1.061	1.082	1.102	1.124	1.154	1.166	1.188	1.210	1.232	1.254	2
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368	1.405	3
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.518	1.574	4
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.685	1.762	5
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870	1.974	6
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076	2.211	7
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.305	2.467	8
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.558	2.773	9
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839	3.106	10
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152	3.479	11
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.498	3.896	12
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.883	4.363	13
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.310	4.887	14
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.758	5.474	15
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	5.311	6.130	16
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	4.054	5.895	6.866	17
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	6.544	7.690	18
19	1.208	1.457	1.754	2.107	2.527	2.026	3.617	4.316	5.142	6.116	7.263	8.613	19
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727	8.062	9.646	20
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	13.585	17.000	25
30	1.348	1.811	2.427	3.243	4.322	5.743	7.712	10.063	13.268	17.449	22.892	29.960	30
35	1.417	2.000	2.814	3.946	5.516	6.686	10.677	14.785	20.414	28.102	38.575	52.800	35
40	1.489	2.208	3.262	4.801	7.040	10.286	14.974	21.725	31.849	45.259	65.001	93.051	40
50	1.645	2.692	4.384	7.107	11.467	18.420	29.457	46.902	74.358	117.391	184.565	289.002	50

TABLE-I (cont.)

Future value interest factor of \$1 at $i\%$ at the end of n periods $(FVIF_{i,n})$, $(FVIF_{i,n})=(1+i)^n$

PERIOD (n)	INTEREST RATE (i)												PERIOD (n)
	13%	14%	15%	16%	17%	18%	19%	20%	25%	30%	40%	50%	
1	1.130	1.120	1.150	1.160	1.170	1.180	1.190	1.200	1.250	1.300	1.400	1.500	1
2	1.277	1.300	1.322	1.346	1.369	1.392	1.416	1.400	1.440	1.690	1.960	2.250	2
3	1.443	1.482	1.521	1.561	1.602	1.643	1.685	1.728	1.728	2.197	2.744	3.375	3
4	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074	2.074	2.856	3.842	5.063	4
5	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488	2.488	3.713	5.378	7.594	5
6	2.082	2.195	2.313	2.436	3.565	2.700	2.840	2.986	2.986	4.827	7.530	11.391	6
7	2.353	2.502	2.660	2.826	3.001	3.185	3.379	3.583	3.583	6.275	10.541	17.086	7
8	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300	4.300	8.157	14.758	25.629	8
9	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.160	5.130	10.604	20.661	38.443	9
10	3.395	3.707	4.046	4.411	4.807	5.234	5.696	6.192	6.192	13.786	28.925	57.665	10
11	3.836	4.226	4.652	5.117	5.624	6.176	6.777	7.430	7.430	17.922	40.496	86.498	11
12	4.335	4.818	5.350	5.936	6.580	7.288	8.064	8.916	8.916	23.298	56.694	129.746	12
13	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699	10.699	30.288	79.372	194.720	13
14	5.535	6.261	7.076	7.988	9.007	10.147	11.420	12.839	12.839	39.374	111.120	291.929	14
15	6.254	7.138	8.137	9.266	10.539	11.974	13.590	15.207	15.047	51.186	155.568	437.894	15
16	7.067	8.137	9.358	10.748	12.330	14.929	16.172	18.488	18.488	66.542	217.795	656.841	16
17	7.986	9.276	10.761	12.468	14.426	16.672	19.244	22.186	22.186	86.504	304.914	985.261	17
18	9.024	10.527	12.375	14.463	16.879	19.673	22.901	26.623	26.623	112.455	426.879	1477.892	18
19	10.197	12.052	14.232	16.777	19.748	23.214	27.252	31.948	31.948	146.192	597.630	2216.838	19
20	11.523	13.723	16.367	19.461	23.106	27.393	32.429	38.998	38.338	190.050	836.683	3325.257	20
25	21.231	26.462	32.919	40.874	50.652	62.669	77.388	95.396	95.396	705.641	4499.880	35251.168	25
30	39.116	50.950	66.212	85.850	111.065	143.371	184.675	237.376	237.376	2620.000	24201.832	191751	30
35	72.069	98.100	133.176	180.314	243.503	327.997	440.701	590.668	590.668	9727.860	130161	1456110	35
40	139.782	188.884	267.864	378.721	533.869	750.378	1051.668	1469.772	1469.772	36118.865	700038	11057332	40
50	450.736	700.233	1083.657	1670.704	2566.215	3927.357	5988.914	9100.438	9100.438	497929.223	20248916	637621500	50

TABLE-II

Present value interest factor of \$ 1 at $i\%$ for n periods $(PVIF_{i,n})$, $(PVIF_{i,n})=1/(1+i)^n$

PERIOD (n)	INTEREST RATE (i)												PERIOD (n)
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909	.901	.893	1
2	.980	.961	.943	.925	.907	.890	.873	.857	.842	.826	.812	.797	2
3	.971	.942	.915	.889	.864	.840	.816	.794	.772	.751	.731	.712	3
4	.961	.924	.888	.855	.823	.792	.763	.735	.708	.683	.659	.636	4
5	.951	.906	.863	.822	.784	.747	.713	.681	.650	.621	.593	.567	5
6	.942	.888	.837	.790	.746	.705	.666	.630	.596	.564	.535	.507	6
7	.933	.871	.813	.760	.711	.665	.623	.583	.547	.513	.482	.452	7
8	.923	.853	.789	.731	.677	.627	.582	.540	.502	.467	.434	.404	8
9	.914	.837	.766	.703	.645	.592	.544	.500	.460	.424	.391	.361	9
10	.905	.820	.744	.676	.614	.558	.508	.463	.422	.386	.352	.322	10
11	.896	.804	.722	.650	.585	.527	.475	.429	.388	.350	.317	.287	11
12	.887	.789	.701	.625	.557	.497	.444	.397	.356	.319	.286	.257	12
13	.879	.773	.681	.601	.530	.469	.415	.368	.326	.290	.258	.229	13
14	.870	.758	.661	.577	.505	.442	.388	.340	.299	.263	.232	.205	14
15	.861	.743	.642	.555	.481	.417	.362	.315	.275	.239	.209	.183	15
16	.853	.728	.623	.534	.458	.394	.339	.292	.252	.218	.188	.163	16
17	.844	.714	.605	.513	.436	.371	.317	.270	.231	.198	.170	.146	17
18	.836	.700	.587	.494	.416	.350	.296	.250	.212	.180	.153	.130	18
19	.828	.686	.570	.475	.396	.331	.277	.232	.194	.164	.138	.116	19
20	.820	.673	.554	.456	.377	.312	.258	.215	.178	.149	.124	.104	20
25	.780	.610	.478	.375	.295	.233	.184	.146	.116	.092	.074	.059	25
30	.742	.552	.412	.308	.231	.174	.131	.099	.075	.057	.044	.033	30
35	.706	.500	.355	.253	.181	.130	.094	.068	.049	.036	.026	.019	35
40	.672	.453	.307	.208	.142	.097	.067	.046	.032	.022	.015	.011	40
50	.608	.372	.228	.141	.087	.054	.034	.021	.013	.009	.005	.003	50

TABLE-III

Future value interest factor of an (ordinary) annuity of \$ 1 per period at i % for n periods

$$(FVIFA_{i,n}), (FVIFA_{i,n}) = \sum_{t=1}^n (1+i)^{n-t} = \frac{(1+i)^n - 1}{i}$$

PERIOD (n)	INTEREST RATE (i)												PERIOD (n)	
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%		
1	1.000	1.000	1.00	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.110	2.120	2	
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310	3.342	3.374	3	
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.710	4.779	4	
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.228	6.353	5	
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	7.913	8.115	6	
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	9.783	10.089	7	
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	11.859	12.300	8	
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164	14.776	9	
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	16.722	17.549	10	
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561	20.655	11	
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	22.713	24.133	12	
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.212	28.029	13	
14	14.947	15.974	17.086	18.292	19.579	21.015	22.550	24.215	26.019	27.975	30.095	32.393	14	
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	26.361	31.772	34.405	37.280	15	
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	39.190	42.753	16	
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545	44.501	48.884	17	
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	50.396	55.750	18	
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	41.018	51.159	56.939	63.440	19	
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	64.203	72.052	20	
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.413	133.334	25	
30	34.785	40.568	47.575	56.085	66.439	79.058	94.461	113.283	136.308	164.494	199.021	241.333	30	
35	41.660	49.994	60.642	73.652	90.320	111.435	138.237	172.317	215.711	271.024	341.590	431.663	35	
40	48.886	60.402	75.401	95.026	120.800	154.762	199.635	259.057	337.882	442.593	581.826	767.091	40	
50	64.463	84.579	112.797	152.667	209.348	290.336	409.529	573.770	815.084	1163.909	1668.771	2400.018	50	

TABLE-III (cont.)

Present value interest factor of an (ordinary) annuity of \$ 1 per period at $i\%$ for n periods

$$(FVIFA_{i,n}), (FVIFA_{i,n}) = \sum_{t=1}^n (1+i)^{n-t} = \frac{(1+i)^n - 1}{i}$$

PERIOD (n)	INTEREST RATE (i)												PERIOD (n)	
	13%	14%	15%	16%	17%	18%	19%	20%	25%	30%	40%	50%		
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1
2	2.130	2.140	2.150	2.160	2.170	2.180	2.190	2.200	2.250	2.300	2.440	2.500	2.500	2
3	3.407	3.440	3.473	3.506	3.539	3.572	3.606	3.640	3.813	3.990	4.360	4.750	4.750	3
4	4.850	4.921	4.993	5.066	5.141	5.251	5.291	5.368	5.766	6.187	7.104	8.125	8.125	4
5	6.480	6.610	6.742	6.877	7.014	7.154	7.297	7.442	8.207	9.043	10.946	13.188	13.188	5
6	8.323	8.536	8.754	8.977	9.207	9.442	9.683	9.930	11.259	12.756	16.324	20.781	20.781	6
7	10.405	10.730	11.067	11.414	11.772	12.142	12.523	12.916	15.073	17.583	23.853	32.172	32.172	7
8	12.757	13.233	13.727	14.240	14.773	15.327	15.902	16.499	19.842	23.858	34.395	49.258	49.258	8
9	15.416	16.085	16.786	17.519	18.258	19.086	19.923	20.799	25.802	32.015	49.153	74.887	74.887	9
10	18.420	19.337	20.304	21.321	22.393	23.755	24.709	25.959	33.253	42.619	69.814	113.330	113.330	10
11	21.814	23.045	24.349	25.733	27.200	28.755	30.404	32.150	42.566	56.405	98.739	170.995	170.995	11
12	25.650	27.271	29.002	30.850	32.824	34.931	37.180	39.581	54.208	74.327	139.235	257.493	257.493	12
13	29.985	32.089	34.352	36.786	39.404	42.219	45.244	48.497	68.760	97.625	195.929	387.239	387.239	13
14	34.883	37.581	40.505	43.672	47.103	50.818	54.841	59.196	86.949	127.913	275.300	581.859	581.859	14
15	40.417	43.842	47.580	51.660	56.110	60.965	66.261	72.035	109.687	167.286	386.420	873.788	873.788	15
16	46.672	50.580	55.717	60.925	66.649	72.939	79.850	87.442	138.109	218.472	541.988	1311.682	1311.682	16
17	53.739	59.118	65.075	71.673	78.979	87.068	96.022	105.931	173.636	285.014	759.784	1968.523	1968.523	17
18	61.725	68.394	75.836	84.141	93.406	103.740	115.266	128.117	218.045	371.518	1064.697	2953.784	2953.784	18
19	70.749	78.969	88.212	98.603	110.285	123.414	138.166	154.740	273.556	483.973	1491.576	4431.676	4431.676	19
20	80.947	91.025	102.444	115.380	130.033	146.638	165.418	186.688	342.945	630.165	2089.206	6648.513	6648.513	20
25	155.620	181.871	212.793	249.214	292.105	342.603	402.042	471.981	1054.791	2348.803	11247.199	50500	50500	25
30	293.199	356.787	434.745	530.312	647.439	790.948	966.712	1181.882	3227.174	8729.985	60501	383500	383500	30
35	546.681	693.573	881.170	1120.713	1426.491	1120.713	2314.214	2943.341	9856.761	32423	325400	2912217	2912217	35
40	1013.704	1342.025	1779.090	2360.757	3134.522	4163.21	5529.829	7343.858	30089	120393	1750092	22114663	22114663	40
50	3459.507	4994.521	7217.716	10435.649	15089.502	21813.1	31515	45497	280256	1659761	50622288	1275242998	1275242998	50

TABLE-IV

Present value interest factor of an (ordinary of \$ 1 per period at i% for a periods (PVIFA_{i,n}),

$$PVIFA_{i,n} = \sum_{t=1}^n 1/(1+i)^t = \frac{1 - [1/(1+i)^n]}{i}$$

PERIOD (n)	INTEREST RATE (i)												PERIOD (n)
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909	.901	.893	1
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	2
3	2.941	2.884	2.717	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	3
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	4
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	5
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.131	4.111	6
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.712	4.564	7
8	7.652	7.326	7.020	6.733	6.463	6.210	5.371	5.747	5.535	5.335	5.146	4.968	8
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	9
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	10
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	11
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	12
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	13
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.255	7.786	7.367	6.982	6.628	14
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.560	8.061	7.606	7.191	6.811	15
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974	16
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.499	7.120	17
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250	18
19	17.226	15.679	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.966	19
20	18.046	16.352	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.963	7.469	20
25	22.023	19.524	17.413	15.622	14.094	12.784	11.654	10.675	9.823	9.077	8.422	7.843	25
30	25.808	22.396	19.601	17.292	15.373	13.765	12.409	11.258	10.174	9.427	8.694	8.055	30
35	29.409	24.999	21.487	18.665	16.374	15.498	12.948	11.655	10.567	9.644	8.855	8.176	35
40	32.835	27.356	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.951	8.244	40
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915	9.042	8.304	50

TABLE-IV (Cont.)

Present value interest factor of an (ordinary) of \$1 per period at $i\%$ for n periods
($PVIFA_{i,n}$)

$$(PVIFA_{i,n}) = \sum_{t=1}^n \frac{1}{(1+i)^t} = \frac{1 - [1/(1+i)^n]}{i}$$

PERIOD (n)	INTEREST RATE (i)												PERIOD (n)
	13%	14%	15%	16%	17%	18%	19%	20%	25%	30%	40%	50%	
1	.885	.877	.870	.862	.855	.847	.840	.833	.800	.769	.714	.667	1
2	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528	1.440	1.361	1.224	1.111	2
3	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106	1.952	1.816	1.589	1.407	3
4	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589	2.362	2.166	1.849	1.605	4
5	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991	2.689	2.236	2.035	1.737	5
6	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326	2.951	2.643	2.168	1.824	6
7	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605	3.161	2.802	2.263	1.883	7
8	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837	3.329	2.925	2.331	1.922	8
9	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031	3.463	3.319	2.379	1.948	9
10	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192	3.571	3.092	2.414	1.965	10
11	5.667	5.453	5.234	5.029	4.836	4.656	4.486	4.327	3.656	3.147	2.438	1.977	11
12	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439	3.725	3.190	2.456	1.985	12
13	6.122	5.842	5.583	5.382	5.118	4.910	4.715	4.533	3.780	3.223	2.469	1.990	13
14	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611	3.824	3.249	2.478	1.993	14
15	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675	3.859	3.268	2.484	1.995	15
16	6.404	6.265	5.954	5.668	5.405	5.162	4.938	4.730	3.887	3.283	2.489	1.997	16
17	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775	3.910	3.295	2.492	1.998	17
18	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.814	3.928	3.304	2.494	1.999	18
19	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843	3.942	3.311	2.496	1.999	19
20	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870	3.954	3.316	2.497	1.999	20
25	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948	3.985	3.329	2.499	2.000	25
30	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979	3.995	3.332	2.500	2.000	30
35	7.586	7.070	6.167	6.215	5.858	5.539	5.251	4.992	3.998	3.333	2.500	2.000	35
40	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997	3.999	3.333	2.500	2.000	40
50	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999	4.000	3.333	2.500	2.000	50

TABLE - LOGARITHMS

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
10	0000	0043	0086	0128	0170						5	9	13	17	21	26	30	34	38
						0212	0253	0204	0334	0374	4	8	12	16	20	24	28	32	36
11	0414	0453	0492	0531	0569						4	8	12	16	20	23	27	31	35
						0607	0645	0682	0719	0755	4	7	11	15	18	22	26	29	33
12	0792	0828	0864	0899	0934						3	7	11	14	18	21	25	28	32
						0969	1004	1038	1072	1106	3	7	10	14	17	20	24	27	31
13	1139	1173	1206	1239	1271						3	6	10	13	16	19	23	26	29
						1303	1335	1367	1399	1430	3	7	10	13	16	19	22	25	29
14	1461	1492	1523	1553	1584						3	6	9	12	15	19	22	25	28
						1614	1614	1673	1703	1733	3	6	9	12	14	17	20	23	26
15	1761	1790	1818	1847	1875						3	6	9	11	14	17	20	23	26
						1903	1931	1959	1987	2014	3	6	8	11	14	17	19	22	25
16	2041	2068	2095	2122	2148						3	6	8	11	14	16	19	22	24
						2175	2201	2227	2253	2279	3	5	8	10	13	16	18	21	23
17	2304	2330	2355	2380	2405						3	5	8	10	13	15	18	20	23
						2430	2455	2480	2504	2529	3	5	8	10	13	15	17	20	22
18	2553	2577	2601	2625	2648						2	5	7	9	12	14	17	19	21
						2672	2695	2718	2742	2765	2	4	7	9	11	14	16	18	21
19	2788	2810	2833	2856	2878						2	4	7	9	11	13	16	18	20
						2900	2923	2945	2967	2089	2	4	6	3	11	13	15	17	19
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2	4	6	8	11	13	15	17	19
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17
23	3617	3636	3655	3674	3692	3711	3729	3747	3760	3784	2	4	6	7	9	11	13	15	17
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	16
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2	3	5	7	9	10	12	14	16
26	4150	4165	4183	4200	4216	4232	4249	4265	4281	4298	2	3	5	7	8	10	11	13	15
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2	3	5	6	8	9	11	13	15
28	4472	4487	4502	4518	4533	4548	4564	4579	4554	4609	2	3	5	6	8	9	11	12	14
29	4624	4639	4654	4669	4683	4698	6713	4728	4743	4757	1	3	4	6	7	9	10	12	14
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1	3	4	6	7	9	10	11	13
31	4914	4928	4942	4955	2969	4983	4997	5011	5024	5039	1	3	4	6	7	8	10	11	13
32	5051	5005	5079	5092	5105	4119	5132	5145	5159	5172	1	3	4	5	7	8	9	11	12
33	5181	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	5	6	8	9	10	12
34	5351	9328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	5	5	7	9	10	12
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	2	4	5	5	7	9	10	11
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1	2	3	5	5	7	8	10	11
37	5682	5094	5705	5717	5729	5740	5752	5763	5778	5786	1	2	3	5	6	7	8	9	11
38	5798	5809	5821	5832	5845	5855	5866	5877	5888	5899	1	2	3	4	6	7	8	9	10
39	5911	5912	5933	5944	5955	5966	5977	5988	5999	6010	1	2	3	4	5	6	8	9	10
40	6021	6031	6042	6053	6069	6075	6085	6096	6107	6117	1	2	3	4	5	6	8	9	10
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	2	3	4	5	6	7	8	10
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	2	3	4	5	6	7	8	9
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1	2	3	4	5	6	7	8	9
44	0435	6444	6454	6464	6474	6485	6193	6503	6513	6522	1	2	3	4	5	6	7	8	9
45	6532	6542	6551	6561	6571	6580	6500	6599	6609	6618	1	2	3	4	5	6	7	8	9
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	0712	1	2	3	4	5	6	7	7	9
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6809	1	2	3	4	5	5	6	7	8
48	6821	6821	6830	6839	6848	6857	6366	6875	6884	6893	1	2	3	4	4	5	6	7	8
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	2	3	4	4	5	6	7	8

TABLE - LOGARTHMS

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	2	3	3	4	5	6	7	8
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	2	3	3	4	5	6	7	8
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	1	2	2	3	4	5	6	7	7
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	1	2	2	3	4	5	6	6	7
54	7324	7332	7340	7345	7356	7364	7372	7380	7388	7396	1	2	2	3	4	5	5	6	7
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	2	2	3	4	5	5	6	7
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	2	2	3	4	5	5	6	7
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	1	2	2	3	4	5	5	6	7
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7707	1	1	2	3	4	4	5	6	7
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	1	1	2	3	4	4	5	6	7
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	1	1	2	3	4	4	5	6	6
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917	1	1	2	3	4	4	5	6	6
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	1	2	3	3	4	5	5	6
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	1	2	3	3	4	5	5	6
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	1	1	2	3	3	4	5	5	6
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	1	1	2	3	3	4	5	5	6
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	1	2	3	3	4	5	5	6
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	1	2	3	3	4	4	5	6
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	1	2	3	3	4	4	5	6
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	1	2	2	3	4	4	5	6
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	1	1	2	2	3	4	4	5	5
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	1	2	2	3	4	4	5	5
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627	1	1	2	2	3	4	4	5	5
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686	1	1	2	2	3	4	4	5	5
74	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745	1	1	2	2	3	3	4	5	5
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	1	1	2	2	3	3	4	5	5
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859	1	1	2	2	3	3	4	4	5
77	8805	8871	8876	8882	8887	8893	8899	8904	8910	8915	1	1	2	2	3	3	4	4	5
78	8921	8927	8932	8938	8943	8949	8959	8960	8965	8971	1	1	2	2	3	3	4	4	5
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	1	1	2	2	3	3	4	4	5
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	1	1	2	2	3	3	4	4	5
81	9085	9090	9096	9101	9103	9112	9117	9122	9128	9133	1	1	2	2	3	3	4	4	5
82	9138	9143	9142	9151	9159	9165	9170	9175	9180	9186	1	1	2	2	3	3	4	4	5
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	1	1	2	2	3	3	4	4	5
84	9242	9248	9253	9258	9263	9269	9274	9279	9284	9289	1	1	2	2	3	3	4	4	5
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9348	1	1	2	2	3	3	4	4	5
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	1	1	2	2	3	3	3	4	4
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	0	1	1	2	2	3	3	4	4
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	0	1	1	2	2	3	3	4	4
89	9094	9499	9504	9509	9513	9518	9523	9528	9533	9538	0	1	1	2	2	3	3	4	4
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	0	1	1	2	2	3	3	4	4
91	9500	9595	9600	9605	9609	9614	9619	9624	9628	9633	0	1	1	2	2	3	3	4	4
92	9038	9643	9647	9652	9657	9661	9666	9671	9675	9680	0	1	1	2	2	3	3	4	4
93	9655	9689	9694	9699	9703	9708	9713	9717	9722	9727	0	1	1	2	2	3	3	4	4
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	0	1	1	2	2	3	3	4	4
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	0	1	1	2	2	3	3	4	4
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	0	1	1	2	2	3	3	4	4
97	9868	9872	9877	9881	9887	9890	9894	9899	9903	9908	0	1	1	2	2	3	3	4	4
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	0	1	1	2	2	3	3	4	4
99	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996	0	1	1	2	2	3	3	4	4

TABLE - ANTILOGARTHMS

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
0	1000	1002	1005	1007	1009	1012	1014	1016	1019	1021	0	0	1	1	1	1	2	2	2
01	1023	1026	1028	1030	1033	1035	1038	1040	1042	1045	0	0	1	1	1	1	2	2	2
02	1047	1050	1052	1054	1057	1059	1062	1064	1067	1069	0	0	1	1	1	1	2	2	2
03	1073	1074	1070	1079	1081	1084	1086	1089	1097	1094	0	0	1	1	1	1	2	2	2
04	1096	1099	1102	1104	1107	1109	1112	1114	1117	1119	0	1	1	1	1	1	2	2	2
05	1122	1125	1127	1130	1132	1135	1138	1140	1143	1116	0	1	1	1	1	2	2	2	2
06	1148	1151	1153	1156	1159	1161	1164	1167	1169	1172	0	1	1	1	1	2	2	2	2
07	1175	1178	1180	1183	1186	1189	1191	1194	1197	1199	0	1	1	1	1	2	2	2	2
08	1208	1205	1208	1211	1213	1216	1219	1122	1225	1227	0	1	1	1	1	2	2	2	2
09	1230	1233	1236	1139	1242	1245	1247	1250	1252	1256	0	1	1	1	1	2	2	2	3
10	1259	1262	1265	1268	1271	1274	1276	1279	1282	1285	0	1	1	1	1	2	2	2	3
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12	1318	1321	1324	1327	1330	1334	1337	1340	1343	1315	0	1	1	1	2	2	2	2	3
13	1349	1352	1355	1358	1361	1365	1368	1371	1374	1346	0	1	1	1	2	2	2	2	3
14	1380	1384	1387	1390	1393	1396	1400	1403	1406	1377	0	1	1	1	2	2	2	2	3
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16	1445	1449	1452	1455	1459	1462	1466	1469	1472	1442	0	1	1	1	2	2	2	2	3
17	1479	1483	1486	1489	1493	1496	1500	1503	1507	1476	0	1	1	1	2	2	2	2	3
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19	1549	1552	1556	1560	1563	1567	1570	1574	1578	1545	0	1	1	1	2	2	2	2	3
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48	3020	3027	3034	3041	3048	3055	3062	3069	3076	3014	1	1	2	2	3	3	3	3	4
49	3090	3097	3105	3112	3119	3126	3133	3141	3148	3083	1	1	2	2	3	3	3	3	4

TABLE - ANTILOGARITHMS

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51	3236	3243	3251	3258	3266	3272	3281	3289	3373	3304	1	1	2	3	4	5	6	6	7
52	3311	3319	3327	3334	3343	3390	3357	3365	3451	3381	1	1	2	3	4	5	6	6	7
53	3388	3396	3404	3412	3420	3428	3436	3445	3533	3459	1	1	2	3	4	5	6	6	7
54	3467	3475	3483	3491	3499	3508	3515	3568	3614	3540	1	1	2	3	4	5	6	6	7
55	3548	3556	3565	3573	3581	3589	3597	3606	3658	3622	1	1	2	4	4	5	6	6	7
56	3631	3639	3648	3656	3664	3673	3681	3690	3784	3707	1	1	2	4	4	5	6	7	8
57	3715	3724	3733	3741	3750	3758	3767	3776	3873	3793	1	1	3	4	4	5	6	7	8
58	3802	3811	3819	3828	3837	3846	3855	3864	3963	3882	1	1	3	4	4	5	6	7	8
59	3890	3899	3908	3917	3926	3936	3945	3954	4055	3972	1	1	3	4	4	5	6	7	8
60	3981	3990	3999	4009	4018	4027	4036	4046	4150	4064	1	1	3	4	5	6	7	8	9
61	4074	4083	4093	4102	4111	4121	4130	4140	4246	4159	1	1	3	4	5	6	7	8	9
62	4169	4178	4188	4198	4207	4217	4227	4230	4745	4256	1	1	3	4	5	6	7	8	9
63	4266	4276	4285	4295	4305	4315	4228	4335	4446	4355	1	1	3	4	5	6	7	8	9
64	4365	4375	4385	4395	4406	4416	4426	4436	4550	4457	1	1	3	4	5	6	7	8	10
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66	4571	4581	4592	4603	4613	4624	4634	4645	4764	4667	1	2	3	4	5	7	8	9	10
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69	4898	4909	4920	4932	4943	4955	4966	4977	5105	5000	1	2	3	5	6	7	8	9	11
70	5012	5028	5035	5047	5058	5070	5082	5093	5224	5117	1	2	3	5	6	7	8	9	11
71	5129	5140	5152	5164	5176	5188	5200	5212	5346	5236	1	2	4	5	6	7	9	10	11
72	5248	5260	5272	5284	5197	5309	5321	5333	5470	6358	1	2	4	5	6	7	9	10	11
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77	5888	5902	5916	5929	5943	5957	5970	5984	6138	6012	1	3	4	6	7	8	10	11	13
78	6026	6039	6053	6067	6081	6095	6109	6124	6281	6152	1	3	4	6	7	8	10	11	13
79	6166	6180	6194	6209	6223	6237	6252	6266	6427	6295	1	3	4	6	7	8	10	11	13
80	6310	6324	6339	6353	6368	6383	6397	6412	6577	6442	1	3	4	6	7	9	11	11	13
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83	6761	6776	6792	6808	6823	6839	6855	6871	7211	6902	2	3	5	6	7	9	11	12	14
84	6918	6934	6950	6966	6983	6998	7015	7031	7379	7063	2	3	5	6	7	9	11	13	14
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89	7762	7780	7798	7816	7834	7852	7870	7889	7907	7925	2	4	5	7	8	11	12	13	16
90	7943	7962	7980	7998	8014	8035	8054	8072	8091	8110	2	4	5	8	8	11	13	14	17
91	8128	8147	8166	8185	8204	8223	8241	8260	8279	8299	2	4	5	8	8	11	13	14	17
92	8318	8337	8356	8375	8395	8414	8433	8453	8472	8492	2	4	5	8	9	12	13	14	18
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96	9120	9141	9162	9183	9204	9226	9247	9268	9290	9311	2	4	5	9	9	13	14	15	20
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98	9550	9572	9594	9616	9618	9461	9583	9705	9727	9750	2	4	5	9	11	14	16	18	20
99	9772	9795	9817	9840	9863	9886	9908	9931	9954	9977	2	5	7	9	11	14	16	18	20

NATIONAL UNIVERSITY

BBA (Hons) Part-1 Exam-2010 [Held in 23-10-2011]

[According to 2009-2010 Session Syllabus]

Business Mathematics

Subject Code: 6375

Time : 4 Hours

Full Marks:100

[N.B. – The figures in the right margin indicate full marks.]

Group A

Answer any twenty short-questions from the followings: 1×20=20

01. (a) If $a, b \in \mathbb{R}^+$ then what is the value of $\sqrt{-a} \times \sqrt{-b}$?
- (b) What is the value of $\log_b a \log_c b \log_a c$?
- (c) For what values of x , the series $\log_e(1+x)$ is valid?
- (d) If $A = \{x \mid x^2 = 4 \text{ and } x = 3\}$ then what type of set A is?
- (e) What is the value of $(A - B) \cap B$?
- (f) What is the slope of the equation of the straight line $x \cos \alpha + y \sin \alpha = p$?
- (g) What is the general equation of a straight line passing through the origin?
- (h) What is the degree of a linear equation?
- (i) What type of line does a linear equation represent?
- (j) What will be the type of the root of the equation $ax^2 + bx + c = 0$, if the discriminant $b^2 - 4ac < 0$.
- (k) In what condition, the roots of the equation $ax^2 + bx + c = 0$ are of opposite in sign?
- (l) What is the general term of $(1+x)^n$?
- (m) What is the sum of $a + ar + ar^2 + \dots$ to infinity when $r < 1$.
- (n) What is the formula for FV in case of compound interest?
- (o) What is the formula for sinking fund?
- (p) What is the condition for symmetric matrix of the square matrix $A = (a_{ij})$.
- (q) In what condition, the multiplication of two matrices $A = (a_{ij})_{m \times n}$ and $B = (b_{ij})_{p \times q}$ is valid?
- (r) In what condition, a square matrix of order n is nilpotent?

(s) What is the necessary condition for maxima and minima of the function $y = f(x)$?

(t) What does $\frac{dy}{dx}$ represent geometrically?

(u) If $y = \log_x a$, then what is the value of $\frac{dy}{dx}$?

(v) What is the value of $\int a^x dx$?

(w) For what value of n , the integration $\int x^n dx$ is not valid?

(x) What is the value of $\int \frac{dx}{x\sqrt{x^2-1}}$?

Group B

(4+4)×5=40

Answer any five of the questions

2. (a) Define rational and irrational numbers with example.

(b) Prove that $\sqrt{5}$ is an irrational number.

3. (a) Prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$

(b) Prove that $(A \cap B)' = A' \cup B'$

4. (a) If $\text{Log}_a N = x$ then prove that $a^x = N$

(b) Prove that $\log_y(\sqrt{x}) \log_z(y^3) \log_x(\sqrt[3]{z^2}) = 1$.

5. (a) If the equations $x^2 + px + q = 0$ and $x^2 + qx + p = 0$ have only one common root, then show that $P + q + 1 = 0$. Also show that the equation

$x^2 + x + pq = 0$ is formed by the other roots of the above given equation.

(b) The demand and supply equations are $2p^2 + q^2 = 11$ and $p + 2q = 7$; respectively. Find the equilibrium price and quantity, where p and q stand for price and quantity respectively.

6. (a) A firm produces 20 units of an item for Tk. 73 and 50 units of item Tk. 97. Assuming the cost function to be linear, find the equation of this line and use it to estimate the cost of product 40 units.

(b) Determine the middle point of the straight line $x + 2y + 7 = 0$ intercepted by the coordinate axes.

7. (a) Show that in the expansion of $\left(x + \frac{1}{x^2}\right)^n$ there cannot be the term independent of x , n is not a multiple of 3.
- (b) Determine the middle term in the expansion of $\left(2x^2 + \frac{1}{3x^2}\right)^{10}$.
8. (a) Prove that $np_r = n - 1pr + r, n - 1pr - 1$.
- (b) There are two vehicles for a team of 9 persons. The capacity of the vehicles are 7 and 4 persons respectively. In how many ways the team can travel?
9. (a) What time will a sum of money become four times itself at 7% per annum compound interest?
- (b) The marginal cost function of a product is given by $\frac{dc}{dq} = 100 - 10q^0 + 0.1q^2$, where q is the output. Obtain the total and average cost function of the firm under the assumption that fixed cost is Tk. 500.

Group C

Answer any four questions from the following:

10×4=40

10. If the demand and supply laws are given respectively by the equation as $4q + 9p = 48$ and $p = \frac{q}{9} + 2$. Find the equilibrium price and quantity.
11. (a) With the help of first principle differentiate $\log_e x$ w.r.t.x.
- (b) Differentiate $(x^x)^x$ w.r.t.x.
12. (a) Total cost of a firm is given by $c = \frac{1}{3}q^3 - 7q + 16$. where q denotes the product. For what number of quantities the production cost would be minimum?
- (b) A company finds that it can sell out a certain product that it produces at the rate of Tk. 2 per unit. It estimates the cost function of the product to be Tk. $\left[100 + \frac{1}{2}\left(\frac{1}{50}\right)^2\right]$ for q unit produced. What is the amount of this maximum profit?

(a) Integrate: $\int \frac{x dx}{\sqrt{4+x}}$

(b) $\int \frac{dx}{1+\tan x}$

4. (a) What is the effective rate of interest?
(b) A man left Tk. 18,000 with the direction that it should be divided in such a way that his three sons aged 8, 2 and 15 years should each receive the same amount when they reached the age of 25. If the rate of interest is $3\frac{1}{2}\%$ p.a. what should each son receive when he is 25 years old?
(c) Find the nominal rate of interest which is equivalent to the effective rate of 12.55% p.a. when interest is payable quarterly.
15. (a) If the p-th term and q-th term are $\frac{1}{q}$ and $\frac{1}{p}$ respectively in an A.P. then what is the sum of pq?
(b) A machine depreciates its value each year by 8% of its value that the beginning of the year. After how many years will its value be less than half its original value?
16. (a) Solve the system of the following equations using matrix method:
(b) A trust fund has Tk. 50,000 that is to be invested into two types of bonds. The first bond pays 5% interest per year and the 2nd bond pays 6% interest per year. Using matrix algebra, determine how to divide Tk. 50,000 among the two types of bonds, so as to obtain an annual interest of Tk. 2780.

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M
C



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