

Total No. of Questions—5]

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[4968]-3004

B.C.A. (Third Semester) EXAMINATION, 2016

BUSINESS MATHEMATICS

(2013 PATTERN)

Time : Three Hours

Maximum Marks : 80

N.B. :— (i) *All questions are compulsory.*

(ii) *Figures to the right indicate full marks.*

(iii) *Use of calculator is allowed.*

1. (A) Attempt any *one* of the following : [6]

(a) The ages of A, B, C are in the ratio 7 : 9 : 12 and their sum of ages 168. Find the ages of A, B and C. Also find the age of A after 7 years.

(b) A certain amount is divided among three persons A, B, C in the ratio of 6 : 7 : 10. Find the amount if Rs. 450 is added to the share of 'C' is equal to half of the whole amount.

(B) Attempt any *two* of the following : [10]

(a) A person spend 10% of his total income on rent, 25% on food, 5% on education of his children and 75% of the remaining on other expenses. If he have Rs. 9,000 at the end of the year, what is his monthly income ?

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- (b) Mr. Harshvardhan purchased 150 toys at Rs. 20 each. He sold all toys at Rs. 25 each. Find out total profit and percentage of profit earned.
- (c) Find the value of x if $x : 3 = (x + 2) : 5$.

2. (A) Attempt any *one* of the following : [6]

- (a) Miss Prapti was paid Rs. 38,880 as commission on sale of washing machine. If the rate of commission was 12% and the price of each washing machine is Rs. 21,600, how many washing machines she sold ?
- (b) Explain the following terms :
- (i) Direct Proportion
 - (ii) Cash Discount
 - (iii) Brokerage.

(B) Attempt any *two* of the following : [10]

- (a) A two-wheeler manufacturing company sells a motor-cycle costing Rs. 54,000 on instalment basis by charging EMI Rs. 5,400 for two years. Find flat rate of interest.
- (b) Let $\frac{1}{17}$ th of the cost price is $\frac{1}{22}$ th of selling price. 10% of the cost price and 5% of the selling price differ by 12. Find the cost price and the selling price.
- (c) In how many years will Rs. 35,000 will amount to Rs. 87,500 at 10% simple interest ?

3. (A) Attempt any *one* of the following : [6]

(a) Let

$$A = \begin{bmatrix} -1 & 2 \\ 5 & 1 \end{bmatrix},$$

find matrix X, such that :

$$2A + 3X = \begin{bmatrix} 4 & 16 \\ -5 & 17 \end{bmatrix}.$$

(b) Determine whether the following matrix is singular :

$$\begin{bmatrix} 2 & 1 & 3 \\ 1 & 1 & -4 \\ 2 & -4 & 5 \end{bmatrix}.$$

(B) Attempt any *two* of the following : [10]

(a) Solve the following system of linear equations by adjoint method :

$$5x + y = 8$$

$$2x + 3y = 11$$

(b) If

$$A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$$

satisfies the matrix equation $A^2 - KA + 2I = 0$,
find K.

(c) If

$$A = \begin{bmatrix} 4 & -3 \\ -1 & 1 \end{bmatrix},$$

find the value of $|A - 3I|$.

4. (A) Attempt any *one* of the following : [6]

- (a) Egg contains 6 units of Vitamin A per gram and 7 units of Vitamin B per gram and cost 12 paisa per gram. Milk contains 8 units of Vitamin A per gram and 12 units of Vitamin B per gram and cost 20 paisa per gram. The daily minimum requirement of Vitamin A and Vitamin B are 100 units and 200 units respectively. Formulate the problem as linear programming problem.
- (b) Find in what time a sum of money will double itself at 8% p.a. compound interest ?

(B) Attempt any *two* of the following : [10]

- (a) Solve the following Linear programming problem graphically.

$$\text{Maximize } Z = 60x + 75y$$

Subject to,

$$x + 2y \leq 70$$

$$2x + 1.5y \leq 60$$

$$x, y \geq 0.$$

- (b) Obtain the initial basic feasible solution to the following transportation problem by using Vogel's approximation method :

Plant	Warehouses				Supply
	1	2	3	4	
P1	3	4	9	2	23
P2	6	5	8	8	27
Demand	12	13	15	10	50

- (c) Price of sugar increased by 10% as a result of which a person gets 1 kg. less in Rs. 88. Find the original rate.

5. (A) Attempt any *one* of the following : [6]

- (a) Explain the following terms :

- (i) Solution to L.P.P.
- (ii) Convex set
- (iii) Optimal solution to L.P.P.

- (b) A dealer in furniture buys chairs at Rs. 340 each. At what price should he mark them for sale, so that he may earn a profit of 25% after giving 15% discount ?

(B) Attempt any *two* of the following : [10]

- (a) Use North-West corner rule to determine an initial basic solution to the transportation problem :

From	To			Supply
	2	7	4	5
	3	3	1	8
	1	6	2	22
	5	4	7	10
Demand	10	20	15	45

- (b) Explain the matrix minima method to find initial basic solution to the transportation problem.
- (c) If $a : b = 4 : 7$ and $b : c = 9 : 5$, find $a : c$.