GOVERNMENT COLLEGE OF COMMERCE AND ECONOMICS
BORDA – MARGAO.
B. Com Semester End Examination , October 2018
Semester- I, COMMERCIAL ARITHMETIC - 1

Time duration : 2 hrs.

Max.Marks:80

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate marks.
3) Use of calculator is allowed.

1. Attempt the following :

a) Write down the truth table for the following compound statement   **(5 x 4=20)**
$(p \wedge q) \rightarrow (\sim p \rightarrow \sim q)$

b) In how many years will the amount of money be three times the principal at simple interest of 20 % per annum ?

c) In how many ways can 2 Americans, 3 Indians and 4 Russians be standing in a line for a photograph so that
(i) The Americans, Indians and Russians are always together respectively.
(ii) The Indians are always separated.

d) For an A.P., if the sixth term is 1 and the thirteenth term is -6, find the nth term of the A.P.

e) Evaluate the following determinant

$\begin{vmatrix} -2 & 3 & -4 \\ -5 & 6 & -7 \\ -8 & 9 & 0 \end{vmatrix}$

OR

1. v) Write down the truth table for the following compound statement: **(5 x 4=20)**
$(\sim q \leftrightarrow \sim p) \vee (q \rightarrow \sim p)$

w) If Rs. 2,000 amounts to Rs. 2,700 at simple interest in 5 years, find the rate of interest.

x) In how many ways can a six digit number be formed from the digits 2,3,4,5,6,7,8,9 such that
(i) Repetition of digits is not allowed.
(ii) Repetition of digits is allowed.

y) A printer costing Rs. 6000 is bought on monthly installments. If the first installment is Rs. 500 and each subsequent installment increases by Rs. 200, find out when will the entire amount of the printer be paid up?

z) A small scale industry is manufacturing two types of toys: dolls and cars. Each toy has to go through the process of moulding and painting. A doll takes 1 hr. for moulding and 3 hrs. for painting, whereas a car needs 2 hrs. for moulding and 2 hrs. for painting. Find the number of dolls and cars produced per week, if the small scale industry utilizes 40 hrs. of moulding and 60 hrs. of painting per week. Assuming that, all the items are sold, calculate the sale of the small scale industry per week, if the doll is priced at Rs. 60 and the car at Rs. 50.

2. Attempt the following: (5 x 4=20)

a) Malerie borrowed Rs. 5000 from a money lender at 30% per annum, to be compounded half yearly. Find the amount and the interest to be paid by her at the end of two years.

b) Find the cofactors of the matrix $A = \begin{bmatrix} 5 & 0 & -1 \\ 0 & 0 & 3 \\ 0 & -2 & -5 \end{bmatrix}$

c) If $X = \{ n \ / \ n \in N \text{ and } n \leq 20 \}$, $A = \{ 1,3,5,7,9,11,13,15,17 \}$, $B = \{ 2,4,6,8,10,12,14,16 \}$ then verify De Morgan's laws.

d) Find the sum of all natural numbers from 150 to 300 which are exactly divisible by 3.

e) Find the number of distinct permutations of the word "MATHEMATICIAN".

OR

II. Attempt the following: (5 x 4=20)

v) A fixed term maturity plan of Reliance Mutual fund declared 15% compound interest per annum. Find the effective rate of interest if the interest is to be compounded half yearly.

w) If $A = \begin{bmatrix} -5 & 5 \\ 6 & -6 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 3 & 0 \\ 0 & -1 & 0 \end{bmatrix}$ Find AB and BA if they exist.

x) If $A = \{4x / x \in N ; 1 \leq x \leq 7\}$, $B = \{x / 3x^2 - 8x + 4 = 0\}$, $C = \{x /(x - 2)(x - 5)(x - 9) = 0\}$ find (i) $A \cup B \cup C$ (ii) $A \cap B \cap C$

y) Find the sum of all natural numbers from 500 to 750 which are exactly divisible by 5.

z) Find the number of distinct permutations of the word "ALLITERATION"

3. Attempt the following :   (5 x 4=20)

a) Test the validity of the following argument in symbolic form :
$p \vee q , \sim p \vdash \sim q$

b) In a consumer-preference survey of an item, fifteen were found to use Brand A, twenty were found to use Brand B, five were found to be in the habit of using both brands A and B. Find the number of consumers using at least one of the two brands of the item.

c) Find the amount for the ordinary annuity with periodic payment as Rs. 5,000, at the rate of interest 10% per annum for 1 year. The period of payment being half yearly.

d) From a pack of 52 cards, two cards are to be selected at random. Find the number of selections such that
(i) both are picture cards.
(ii) One is an Ace and the other is a King of diamond.

e) If the second term of a G.P. is 12 and its sixth term is 192, find its first term and the common ratio.

OR

III. Attempt the following: (5 x 4=20)

v) Test the validity of the following argument:
If wishes were horses then beggars would ride. Beggars did not ride. Therefore, wishes are not horses.

w) In a competition, a school awarded medals in different categories. 36 medals in dance, 12 medals in dramatics and 18 medals in music. If these medals went to a total of 45 persons and only 4 persons got medals in all the three categories, how many received medals in exactly two of these categories?

x) Eighteen members in a Co-operative Housing Society proposed to start a sinking fund towards the future repairs of the building. If the estimated cost of repairs is Rs. 1,25,010, how much yearly contribution has each member to make at 15% interest to be compounded on yearly basis, so as to meet the requirements at the end of 3 years, given that the yearly payments by the members are made at the end of each year.

y) Three cards are selected at random from a pack of 52 cards. Find the number of selections such that
(i) one card is a spade and the remaining are red
(ii) All three cards are of the same denomination

z) If the fifth term of a G.P. is 256 and the eighth term is 16384, find its first term and the common ratio.

4. Attempt the following: (5 x 4=20)

a) Find the present value of an ordinary annuity of Rs.1,500/- per year for 4 years at 8% per annum.

b) A person has taken a loan of Rs. 80,000 to be returned in 5 monthly installments at the rate of 12% per annum compounded monthly. Find the equal monthly installments (EMI) using the reducing balance method.

c) A committee of five is to be formed from 8 professors and 7 students such that
   (i)The committee must contain all professors
   (ii)The committee consists of at least four students

d) Find the sum of 5+55+555+5555+.............upto n terms.

e) Solve the following equations using Cramer's rule.
   $2x - y + 3z = 4, \quad x + y + z = 2, \quad 3x + y - z = 2$

OR

IV. Attempt the following: (5 x 4=20)

v) A person is promised the final amount of a half yearly ordinary annuity with periodic payment of Rs. 1,600, the duration of the annuity being 4 years and the rate of interest as 10% is to be compounded half yearly. Find the present value of the annuity.

w) A sum was borrowed at 7% interest to be compounded annually. It was repaid in 8 equal installments of Rs. 7,000 each, paid at the end of each year. Find the sum borrowed.

x) A football team is to be selected from 3 goalkeepers, 7 defenders and 8 mid fielders such that the team consists of
   (i) At least 7 mid fielders and exactly 1 goalkeeper.
   (ii) 5 defenders, 5 mid fielders and 1 goalkeeper.

y) Find the sum of 9+99+999+9999+............. upto n terms.

z) If $A = \begin{bmatrix} -5 & 0 & 0 \\ 0 & -5 & 0 \\ 0 & 0 & -5 \end{bmatrix}$, then find $A^2 + I$ where I is a unit matrix of order 3.