GOVT. COLLEGE OF COMMERCE
BORDA – MARGAO.
B. Com (Semester - I) : October 2017
COMMERCIAL ARITHMETIC - I

ime 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.

Attempt the following :

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

b) In how many years will the amount of money be double the principal at simple interest of 12% per annum ?

c) In how many ways can 4 professors, 5 students and 3 clerks be standing in a line for a photograph so that
(i) The Professors, the students and the clerks are always together respectively.
(ii) No two students are together.

d) For an A.P., if the seventh term is 39 and the tenth term is 54, find the sum of first ten terms.

e) Evaluate the following determinant

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

OR

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

w) If Rs. 2,400 amounts to Rs. 2,760 at simple interest in 3 years, find the rate of interest.

x) In how many ways can a four digit number be formed from the digits 1,2,3,4,5,6,7,8,9 such that
(i) Repetition of digits is allowed.
(ii) Repetition of digits is not allowed.

y) From a small town 50 girls completed graduation in the year 2001. It was observed that, every year the number of girls completing graduation from that town, increased by 25 than the preceeding year. As per the above estimation, find out how many girls from the same town, would complete their graduation in the year 2010. Also state the total number of girls completing graduation from 2001 upto 2010.

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 mouldi 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) Ketan borrows Rs. 2,000 from Sachin at compound interest of 10% per annum, to be calculated on quarterly basis. What amount is due to him after 9 months? Also state his interest.

b) Find the cofactors of the matrix $A=\begin{bmatrix} 2 & -1 & 3 \\ -2 & 0 & -2 \\ -4 & -3 & -1 \end{bmatrix}$

c) If $X = \{ n / n \in N \}$, $A = \{ 6n / n \in N \}$, $B = \{ 7n / n \in N \}$, then verify De Morgan's laws.

d) Find the sum of all natural numbers from 200 to 500 which are exactly divisible by 5.

e) Find the number of distinct permutations of the word 'INGENUOUSNESS'.

OR

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

v) A fixed term maturity plan of a well-known Mutual fund declared 12% compound interest per annum. Find the effective rate of interest if the interest is to be compounded
(i) Yearly (ii) Half-yearly

w) If $A=\begin{bmatrix}-2 & -4\\ 8 & 8\\ 10 & 10\end{bmatrix}$, $B=\begin{bmatrix}-1 & -2 & -3\\ 6 & 0 & 6\end{bmatrix}$ Find AB and BA if they exist.

x) If $A=\{3x/x\in N;\ 1\le x\le 5\}$, $B=\{x/x^2-5x+6=0\}$, $C=\{x/(x-5)(x-6)(x-7)=0\}$
find (i) $A\cup B\cup C$ (ii) $A\cap B\cap C$

y) Find the sum of all natural numbers from 600 to 800 which are exactly divisible by 7.

z) Find the number of distinct permutations of the word 'INDIFFERENCE'.

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

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

b) Of the total number of 200 students appearing in an examination, 140 passed in Mathematics and 100 passed in Statistics. If 40 of them failed in both Mathematics and Statistics, find the percentage of students who have passed in both.

c) Find the amount for the ordinary annuity with periodic payment as Rs. 1,000, at the rate of interest 12% per annum for 1 year. The period of payment is (i)Yearly (ii) 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) Exactly one card is a King.
(ii) One is a red card and one is a black card.

e) If the third term of a G.P. is 50 and its sixth term is 6250, 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:
Whenever I am free I play Table-Tennis. I did not play Table-Tennis.
Therefore I am not free.

w) In a class of 75 students, the following observations were made:
40 students play cricket, 35 students play hockey, 10 students play both hockey and football, 12 students play both cricket and football, 4 students play all three games.
Draw a Venn diagram showing these sets and find
(i) the number of students who play either cricket or football,
(ii) the number of students not playing any game.

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) two are picture cards and one is a non picture card.
(ii) All three cards are of the same suit.

z) If the fourth term of a G.P. is 54 and its seventh term is 1458, find its first term and the common ratio.

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

a) Find the present value of an annuity of Rs. 2,000, paid at the end of each year for 4 years, at 11% compounded annually.

b) A sum was borrowed at 24% interest to be compounded monthly. It was repaid in 12 equal instalments of Rs. 1,300 each, paid at the end of each month. Find the sum borrowed.

c) A cricket team of 11 players is to be selected from 8 batsmen and 7 bowlers such that the team consists of
(i) At least seven batsmen
(ii) At the most 6 batsmen.

d) Find the sum of 7+77+777+7777+.....

e) Solve the following equations using Cramer's rule.
$x+2y+z=7, \quad 3x+z+5=0, \quad 2y+z=9$

OR

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

v) Find the present value of an ordinary annuity of Rs. 3,500 per year for 3 years at 12% per annum.

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

x) A football team of 11 players is to be selected from 2 goalkeepers, 8 defenders and 6 mid fielders such that the team consists of
(i) At least five mid fielders and exactly one goalkeeper.
(ii) Six defernders, four mid fielders and one goalkeeper.

y) Find the sum of 3+33+333+3333+.....

z) If $A=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}$, then find A^2-2A