Vidya Vikas Mandal's
Shree Damodar College of Commerce & Economics
FYBCOM, Semester I, Semester End Examination, October-2017
COMMERCIAL ARITHMETIC

Duration: 2 hours Max Marks: 80

INSTRUCTIONS:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of nonprogrammable and non scientific calculators is allowed.

Q.1 Attempt the following: **(5 X 4 = 20)**

a Construct a truth table for the following statement: $(p \vee q) \leftrightarrow (q \vee (r \rightarrow p))$

b Find the compound interest on a loan of Rs.10, 000 for 5 years if interest is added semi-annually at 10% per annum.

c In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?

d The first three terms of an arithmetic sequence are 7, 9.5, and 12.
(a) What is the 41^{st} term of the sequence?
(b) What is the sum of the first 101 terms of the sequence?

e Solve the following equations by Cramer's Rule:

3x+4y=12 , 4x+5y=20

OR

QI

p Check the validity of the following argument:
If I do not keep to my appointment then I have no credibility. I have kept my appointment. Therefore, I have credibility.

q Find the effective interest rate of 12% p.a.compounded half-yearly.

r How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 5 when repetition of digits are not allowed.

s Find an A.P. whose 10^{th} term is 5 and 18^{th} term is 77.

t Solve the equation $\begin{vmatrix} x & 2 & 3 \\ 3 & 5 & 8 \\ x+1 & 7 & 12 \end{vmatrix} = 0$

Q2 ATTEMPT THE FOLLOWING: **(5 X 4 = 20)**

a At the end of each year for 4 years, Kobus deposits Rs. 500 into an investment account. If the interest rate on the account is 10% per annum compounded yearly, determine the value of his investment at the end of the 4 years.

b A survey of 85 students asked them about the subjects they liked to study. Thirtyfive students liked maths, 37 liked history, and 26 liked physics. Twenty liked maths and history, 14 liked mathsand physics, and 3 liked history and physics. Two students liked all three subjects.

(i) How many of these students like mathsor physics?
(ii) How many of these students didn't like any of the three subjects?
(iii) How many of these students liked mathsand history but not physics?

c Find the number of terms in the geometric progression 6, 12, 24, ..., 1536.

d From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 4 women are there on the committee. In how many ways can it be done?

e Given $A=\begin{bmatrix}2 & 4 & 0\\ 3 & 9 & 6\end{bmatrix}$ and $B=\begin{bmatrix}1 & 4\\ 2 & 8\\ 1 & 3\end{bmatrix}$ Verify $(AB)^t = B^t A^t$.

OR

QII

p Find the present value of an annuity of Rs. 2000, paid at the end of each year for 4 years, at 11% compounded annually.

q Let A = {3, 5, 7}, B = {2, 3, 4, 6} and C = {2, 3, 4, 5, 6, 7, 8}. Verify
(i) $(A \cap B)' = A' \cup B')$ (ii) $(A \cup B)' = A' \cap B'$

r Find three numbers in G.P. such that their product is 1728 and the sum of first and second term is 36.

s How many numbers of 5 digits can be formed using the digits 1,2,3,4,5,6 such that
i) No digit is repeated. ii) Repetition of digits is allowed.

t Find the values of a and b from the matrix equation:

$$\begin{bmatrix}3 & 2\\ 4 & 1\end{bmatrix}\begin{bmatrix}a & 1\\ 5 & b\end{bmatrix} = \begin{bmatrix}4 & 5\\ -3 & 5\end{bmatrix}$$

Q3 ATTEMPT THE FOLLOWING: **(5 X 4 = 20)**

a If $A \cup B=\{1,2,3,4,5,6,7,8,9\}$ $A \cap B=\{5\}$ and $A=\{x: x^2-11x+30=0\}$. Find the set B, A-B, B-A.

b A loan of Rs. 90,000 is to be returned in 3 monthly installments at the rate of 12% p.a. Find the EMI using the flat rate interest method?

c Check whether following statement is tautology or not

$[(p \rightarrow q) \wedge (p \vee r) \wedge (\sim q)] \rightarrow r$

d Four boys and five girls are made to stand in a line for a dance competition. How many different arrangements can be done so that, no two girls are together?

e A sum of Rs. 72,800 is to be repaid in 6 monthly installments, such that each installment is three times the previous installment. Find the first and the last installments.

OR

QIII

p Write all the subsets of set $A=\{x / 2\ x^2+7x+5=0\}$.

q Gerald wants to buy a new guitar worth Rs. 7400 in a year's time. How much must he deposit at the end of each month into his savings account, which earns a interest rate of 9 % p.a. compounded monthly?

r Prove that the following statements are equivalent.

$$(p \rightarrow q) \vee r \; ; \quad [(p \vee r) \rightarrow (q \vee r)]$$

s In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and 3 women?

t Find three numbers in A.P. whose sum is 15 and the product is 45.

Q4 ATTEMPT THE FOLLOWING: (5 X 4 = 20)

a How many 6 digit telephone numbers can be formed if each number starts with 35 and no digit appears more than once?

b Two brothers Ram and Shyam , invest Rs. 8,500 and Rs. 6,000 for purchasing two types of shares. The number of shares of each type acquired by them is listed in the following table. Find the price of each type of shares.

	Type I shares	Type II shares
Ram	40	30
Shyam	30	20

c The simple interest at 20% p.a. on a certain sum of money for 4 years is Rs. 25,600. Find the compound interest on the sum at the same rate for the same period ?

d Find the first term and common ratio, for the G.P. whose third term is 12 and the sixth term is 96.

e A bank offers fixed deposits for 5 years under the following schemes:

a. At 15% if the interest to be compounded half yearly.
b. At 12% if the interest to be compounded quarterly.

State which scheme is more beneficial to the public?

OR

QIV

p If C (9, r) =C (9, r+1) find the value of (i) r (ii) C (5, r).

q If $X = \begin{bmatrix} 3 & 1 & 1 \\ 5 & 2 & 3 \end{bmatrix}$ and $Y = \begin{bmatrix} 2 & 1 & 1 \\ 7 & 2 & 4 \end{bmatrix}$, find

(i) X+Y (ii) 2X-3Y (iii) A matrix Z such that X+Y+Z is a zero matrix.

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

s Find an A.P. whose 10^{th} term is 5 and 18^{th} term is 77.

t Pankuri has taken a loan of Rs. 5 lakh which is to be repaid over 20 years in EMI, with 10% annual interest. Calculate the EMI using reducing balance method. Also state the interest paid by her.