

**Semester End Examination, Oct-Nov. 2019**

Programme: B.COM

Subject: MATHEMATICS

Course Code: CC4

Course Title: COMMERCIAL ARITHMETIC – I

Category: CORE COURSE

Semester: I

Paper No: 01

Time: 2 Hrs

Max. Marks: 80

Instructions:

1. The question paper contains 4 questions spread across 3 pages.
2. All questions are compulsory however internal choice is available.
3. You may answer randomly but every main question attempted should be answered serially.
4. Figures to the right in brackets indicate maximum marks.
5. Use of calculator is strictly forbidden.

**Q1. Attempt the following.**

(4 x 5 =20)

1. Construct a truth table for the statement  $(p \rightarrow q) \vee (\sim p \wedge q)$ .
2. Find the value of n, if  $5({}^n P_4) = {}^{n+1} P_4$
3. If 5<sup>th</sup> term of an A. P is 21 and its 9<sup>th</sup> term is 37, then find its first term, common difference and n<sup>th</sup> term.
4. Calculate the Simple Interest on ₹1450 at the rate of interest 6% p.a for 3 years.

**OR**

**Q1. Attempt the following.**

(4 x 5 =20)

- i) Check whether the following statement is tautology, contradiction or contingency.

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

- ii) In how many ways the letters of the word "UNDERSTAND" can be arranged?
- iii) Find n<sup>th</sup> term and sum of first n terms of an Arithmetic Progression 2, 5, 8, 11, ..... and hence deduce  $T_8$  &  $S_6$ .
- iv) How much amount we will get on investing ₹3000 for 4 years at 8% p.a, considering the interest calculated is simple interest?

**Q2. Attempt the following.**

(4 x 5 =20)

1. Test the validity of the following argument

**The poem is readable if and only if the print is clear.**

**The print is not clear**

**Therefore the poem is not readable.**

- In how many ways a 4 digit number can be formed using the digits 0, 1, 3, 5, 6, 7 such that (i) digits are repeated (ii) digits are not repeated.
- Find  $T_n$  and  $S_n$  of the Geometric Progression 2, 6, 18, 54, ..... And hence find  $T_7$  &  $S_7$ .
- Ravi borrowed ₹5000 from bank at 10% p.a for 2 years. Find the interest he has to pay if it is compounded annually.

OR

QII. Attempt the following.

(4 x 5 = 20)

- Are the  $(q \vee p) \leftrightarrow (\sim p \wedge q)$  and  $(p \wedge q) \rightarrow (\sim q \vee p)$  statements equivalent? Justify.
- Find the total number of arrangements for the letters of the word "DAUGHTER" such that vowels are at end points.
- The sum of first n terms of a G. P is 315 with its first term as 5 and common ratio equal to 2. Find the number of terms and  $n^{\text{th}}$  term of a G. P.
- Find the amount on ₹2000 after 6 months at rate of interest of 8% per year to be compounded quarterly.

Q3. Attempt the following.

(4 x 5 = 20)

- If  $X = \{1, 2, 3, \dots, 10\}$  is the universal set such that  $A = \{1, 3, 4, 7\}$ ,  $B = \{2, 3, 6, 7, 8\}$  and  $C = \{1, 3, 5, 7, 9\}$  are its subsets, then verify the following.  
(i)  $(A \cup B)^C = A^C \cap B^C$  (ii)  $C - A = A^C \cap C$
- A committee of 5 students has to be formed from 4 boys and 6 girls such that committee has (i) at least 2 boys (ii) at most 1 girl.
- Which scheme is beneficial to public, a simple interest at 10% p.a for 10 years or a compound interest at 8% p.a for 8 years to be compounded quarterly?  
[Given that  $(1.02)^{32} = 1.884$ ]
- Find matrix  $X$  if  $2A + X - 3B = C$ , where

$$A = \begin{bmatrix} 2 & -1 & 0 \\ 3 & 2 & 5 \end{bmatrix}, B = \begin{bmatrix} 1 & -3 & -2 \\ 0 & 1 & 2 \end{bmatrix}, C = \begin{bmatrix} -4 & 5 & 1 \\ 4 & 2 & 0 \end{bmatrix}$$

OR

QIII. Attempt the following.

(4 x 5 = 20)

- If  $X = \{1, 2, \dots, 12\}$  is the universal set such that  $P = \{1, 4, 7, 10, 11\}$ ,  $Q = \{2, 5, 7, 9, 12\}$ ,  $R = \{2, 4, 6, 8, 12\}$  are its subsets then verify that  
i)  $P \cup (Q \cap R) = (P \cup Q) \cap (P \cup R)$  (ii)  $(P \cap Q)^C = P^C \cup Q^C$
- Out of 6 Professors and 5 students, a committee of 4 is to be formed such that it contains (i) not more than 2 students (ii) exactly 2 Professors.
- Suresh invested certain amount in a bank for 2 years at 7% p.a and got a simple interest of ₹280. He kept aside the interest and invested the same amount for 3 years at 8% p.a rate of interest to be compounded half yearly. Find the final amount he received and also the compound interest. [Given that  $(1.04)^6 = 1.265$ ].

iv. Find the values of  $a$ ,  $b$  and  $c$  if  $2 \begin{bmatrix} 3 & -1 \\ a & b \\ 2 & c \end{bmatrix} + 3 \begin{bmatrix} -3 & 1 \\ 0 & 3 \\ 5 & -2 \end{bmatrix} = \begin{bmatrix} -3 & 1 \\ -8 & 1 \\ 19 & -3 \end{bmatrix}$

**Q4. Attempt the following.**

**(4 x 5 =20)**

1. In a class of 120 students with 80 boys, 35 boys failed in Commercial Arithmetics, Find the number of girls failed in Commercial Arithmetics if total number of students who passed in Commercial Arithmetics is 70.
2. A newly married wife was given ₹ 500 after completion of 1<sup>st</sup> month of their marriage by her husband and promised that he will increase the amount by ₹ 250 for every successive month. Find the total money she will be having on the day of their 1<sup>st</sup> marriage anniversary. Also calculate the amount she got on the day of her marriage anniversary.
3. Find the maturity value of an ordinary annuity towards the investment of ₹5000 per year at 6% rate of interest to be compounded yearly for 5 years. Also calculate the capital invested. [Given that  $(1.06)^5 = 1.36$ ]
4. Find  $\begin{vmatrix} 2 & 3 & -4 \\ 0 & 5 & 1 \\ -2 & 3 & 6 \end{vmatrix}$ .

**OR**

**QIV. Attempt the following.**

**(4 x 5 =20)**

- i. In a class of 50 students of Banking and accounting, 23 students have taken Banking. Out of these, 15 have taken Banking but not Accounting. Using Venn diagram, find the number of students who have taken Banking and Accounting both, and those who have taken Accounting but not Banking.
- ii. Simran bought a car for ₹15 lacs on 1<sup>st</sup> January 2011. If rate of depreciation of a car is 20%, find its value on 1<sup>st</sup> January 2015. Also calculate its scrap value if estimated life of car is 20 years. [Given that  $(0.8)^{20} = 0.012$ ].
- iii. A loan of ₹90,000 is to be returned in 3 monthly installments at the rate of 12% per annum. Find the EMI (Equated Monthly Installment).
- iv. Using Cramer's rule solve the system of equations 
$$\begin{matrix} 2x - 3y - 1 = 0 \\ x + 4y = 6 \end{matrix}$$