

**CARMEL COLLEGE OF ARTS, SCIENCE & COMMERCE FOR WOMEN,
NUVEM-GOA**

SEMESTER END EXAMINATION, NOVEMBER 2022

Semester: I OF BCOM

Course Title: Commercial Arithmetic I

Course Code: UCAC101

Total marks: 80

Date: 23/11/2022

Duration: 2 Hrs

Total No of pages: 3

Instructions: i) All questions are compulsory.

ii) Figures to the right indicate the maximum marks.

iii) Non-programmable calculators are allowed.

1. Attempt any 4 of the following:

(4x4=16 marks)

a) Prove that the following statements are equivalent:

$$p \rightarrow q \text{ and } \sim p \vee q$$

b) How many different numbers of 4 digits can be formed using the digits 1, 3, 5, 7 and 9 such that no digit is repeated?

c) From a group of 15 boys and 10 girls a committee of 4 boys and 3 girls is to be formed. Find the total number of ways the committee can be formed.

d) Find the value of n if ${}^nP_5 = {}^nP_6$.

e) Ashok invests ₹ 600 in the first month and increases his monthly investment by ₹ 50 in every succeeding month. What will be his investment at the end of 4 years?

f) For the G. P. with $a = .4$ and $r = 3$ find T_6 and T_{11} .

2. Attempt any 4 of the following:

(4x4=16 marks)

a) If $A = \{1, 2, 3, 4\}$ and the universal set $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ verify that $(A')' = A$. [Here A' denotes the complement of the set A]

b) Find the principal and amount to earn ₹ 150 simple interest in 6 years at the rate of 5% per annum.

c) A person has taken a loan of ₹ 80,000 to be returned in 5 monthly installments at the rate of 12% p. a. compounded monthly. Find the E. M. I. using the reducing balance method.

d) Find the amount received when a sum of ₹ 500 is invested at 12 % p.a. for 2 years, if the interest is compounded half-yearly.

e) Evaluate $\begin{vmatrix} 1 & 2 & 2 \\ 3 & -1 & 1 \\ 4 & 3 & 2 \end{vmatrix}$.

f) Find x if $\begin{vmatrix} 2 & 1 \\ 4x & 8 \end{vmatrix} = 20$

3. Attempt the following:

(2x6=12 marks)

A. Using appropriate symbols translate the following statement into symbolic form:

If Mr. X is happy then his wife is unhappy and if his wife is unhappy then Mr. X is unhappy which together implies that Mr. X is always unhappy.

B. Find the number of distinct permutations of the letters of the following words:

- i. SURROUNDINGS
- ii. COMMITTEE

OR

3. Attempt the following

(2x6=12 marks)

X. Find whether the following statement is a tautology, contradiction or neither:

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

Y. Find the number of permutations of the letters of the word "ARRANGE" so that the 2 R's are always together.

4. Attempt the following:

(2x6=12 marks)

A. If for an A. P. $T_5 = 35$ and $T_9 = 59$, find its n^{th} term. Also find T_{15} .

B. A sum of ₹ 10,230 is to be paid in 5 monthly installments such that each installment is four times the previous installment. Find the first and the last installment.

OR

4. Attempt the following:

(2x6=12 marks)

X. Find the sum of all the natural numbers from 100 to 300 which are exactly divisible by 3.

Y. If Ajay purchases a car for ₹ 3,00,000 today, what will be its value after 3 years assuming that the rate of depreciation per year is 20%? Also find its scrap value if its estimated life is 20 years.

5. Attempt the following

(2x6=12 marks)

A. Let $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ be the universal set, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$. Verify that $(A \cup B)' = A' \cap B'$. [Here C' denotes the complement of the set C]

B. If $A = \begin{bmatrix} 0 & 1 \\ 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ verify that $(A + B)^t = A^t + B^t$. [Here C^t denotes the transpose of C]

OR

5. Attempt the following

(2x6=12 marks)

X. In a group of 65 students, 40 passed in Mathematics, 10 passed in Mathematics and Accountancy. How many passed in Accountancy alone and not in Mathematics? How many passed in Accountancy? Draw Venn diagram.

Y. Find the point of intersection of the following pair of lines:
 $5x - 3y = 8$ and $2x - 5y = -12$

6. Attempt the following

(2x6=12 marks)

A. Find the amount for the ordinary annuity with periodic payment as ₹ 2,000 at the rate of interest 12% p.a., for 2 years if the period of payment is monthly.

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

OR

6. Attempt the following

(2x6=12 marks)

X. An organization anticipated a capital expenditure of ₹ 2,50,000 for a new equipment in 5 years. How much should be deposited annually in a sinking fund carrying 12% p.a. interest being compounded yearly to provide for a purchase.

Y. For an ordinary annuity of ₹ 4,000 per quarter for 2 years at 16% interest to be calculated quarterly, find its present value.

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