

MES COLLEGE OF ARTS & COMMERCE, ZUARINAGAR - GOA
B.Com. (CBCS) I Semester End Special Examination, March 2022
CC 4 – COMMERCIAL ARITHMETIC–I (UCAC101)

- Instructions :** i) All questions are compulsory, however internal choice is available.
ii) Figures against every question indicate marks allotted.
iii) Use of simple (non Scientific) calculator is allowed.

Duration: 2 Hours

Max. Marks: 80

Q I) Answer the following:

(5 × 4 = 20)

- a) Construct the truth table for the following statement:

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

- b) Find the Simple Interest on Rs. 25000 invested for 5 years at 6% p. a. rate of interest.

- c) In how many ways can 4 balls be selected from a bag containing 24 balls?

- d) Find S_{20} for the following **Arithmetic Progression(AP)**:
20, 30, 40, 50, 60, ...

- e) Check if the matrix $A = \begin{bmatrix} 9 & 9 & 9 \\ 5 & 8 & 5 \\ 2 & 2 & 2 \end{bmatrix}$ is Singular.

OR

Q I) Answer the following:

(5 × 4 = 20)

- p) Check the validity of the following argument:

$$p \wedge q, p \vdash \sim q$$

- q) Find the future value of the following ordinary annuity:

Rs. 10000 invested per year for 3 years at 7 % p. a. compounded annually.

- r) How many 4 digit numbers can be formed using the digits 1, 7, 8 and 9 when repetition of digits is allowed ?

- s) If for a **Geometric Progression (GP)**, $t_4 = 80$ and $t_7 = 640$, then find r.

- t) If A and B are two matrices given by $A = \begin{bmatrix} 2 & 7 \\ 4 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 8 \\ 9 \end{bmatrix}$, then find AB.

Q II) Answer the following:

(5 × 4 = 20)

- a) Prove that the following statement is a Contradiction:
 $(p \wedge \sim p) \wedge (p \vee q)$
- b) If $X = \{11, 22, 33, 44, 55, 66, 77, 88, 99, 110, 121\}$ is the Universal set,
 $A = \{11, 33, 55, 66, 88, 110\}$ and $B = \{22, 44, 66, 88, 110\}$ are 2 sets,
then find $A \cup B$, $A \cap B$, B' and $A - B$.
- c) Find the future value of Rs. 120 after 2 years if compound interest rate is 5% p.a.
compounded annually.
- d) Find the value of ${}^8C_5 + {}^8C_4$.
- e) Shriya invests Rs. 1000 in the first month and increases her investment by Rs. 32
every succeeding month. Find the total investment done by her at the end of 5 years?

OR

Q II) Answer the following:

(5 × 4 = 20)

- p) Check if the following statements are logically equivalent:
 $\sim(p \rightarrow q)$ and $p \leftrightarrow q$
- q) If X is the Universal set given by $X = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25\}$,
 $A = \{1, 3, 5, 7, 9, 15, 17, 19\}$ and $B = \{11, 13, 15, 17, 19, 21, 23, 25\}$ are 2 sets, then
verify if $(A \cap B)' = A' \cup B'$.
- r) Find the present value of an annuity of Rs. 100000 payable at the end of each year
for 5 years the interest being 10% p. a. compounded annually.
- s) In how many ways can each letters of the word "**PENCIL**" be arranged so that vowels
are always together?
- t) Which term of the **Arithmetic Progression(AP)** 55, 75, 95, 115, ... is 655?

Q III) Answer the following:

(5 × 4 = 20)

- a) In how many years will Rs. 25000 yield Rs. 18750 as Simple Interest at 15% p. a. rate of
interest?
- b) If A and B are 2 matrices given by $A = \begin{bmatrix} 2 & 7 \\ 8 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 5 & 1 \end{bmatrix}$, then find $3A - 2B$.

c) 210 students of a certain school were surveyed. The survey revealed that 75 students like Sanskrit, 85 like Konkani and 40 students like both Sanskrit and Konkani. Find the number of students who like either Sanskrit or Konkani.

d) Find t_{20} and t_{32} for the following **Arithmetic Progression (AP)**:
15, 20, 25, 30, ...

e) How many different words can be formed using each letter of the word "STATISTICS" ?

OR

Q III) Answer the following:

(5 × 4 = 20)

p) A person has taken a loan of Rs. 25000 which is to be repaid in 6 monthly installments. If the interest rate is 12% p.a. compounded monthly, then find the EMI using reducing balance method.

q) If $A = \begin{bmatrix} 6 & 1 & 9 \\ 21 & 0 & 12 \\ 3 & 15 & 0 \end{bmatrix}$, then find A^T and C_{32} .

r) If $X = \{1, 2, 3, 4, 5\}$ is the Universal set, A and B are 2 sets, such that $A = \{x | x \in X, x^2 - 9x + 20 = 0\}$ and $B = \{4, 5\}$, then check if $A = B$.

s) A person invests Rs. 2 on the first day and doubles his investment every succeeding day. Find total investment done by him at the end of 5th day.

t) Find the value of i) ${}^{23}P_2$

ii) $\frac{20!}{4! \times 17!}$

Q IV) Answer the following:

(5 × 4 = 20)

a) Rupali obtained a loan of Rs. 500000 at 6% p. a. flat rate of interest to be paid back in monthly instalments over a period of 5 years. How much is the value of each **EMI**?

b) How many different words can be formed using each letter of the "CRYSTAL" which begin with C and end with L?

c) If for an **Arithmetic progression (AP)**, $t_{26} = 508$ and $t_{22} = 428$, then find a and d.

d) Find the amount received when Rs. 2700 is invested for 5 years at 8%p.a. rate of interest compounded annually.

e) Solve the following equations using Cramer's Rule:

$$3x + 8y = 11 \text{ and } 2x + 7y = 9$$

OR

Q IV) Answer the following:

(5 × 4 = 20)

p) Find the present value of Rs. 15750 required 3 years from now if the compound interest rate is 8% p. a. compounded annually.

q) In a company there are 16 female employees and 13 male employees. In how many ways can a committee of 3 be chosen from this so as to include exactly 2 female employees and 1 male employee?

r) Find S_6 for the following **Geometric Progression (GP)**:

$$10, 50, 250, 1250, \dots$$

s) Find the effective rate of interest equivalent to the nominal rate of 25% p. a. when compounded semi – annually .

t) A store owner keeps a record of number of books of Mathematics and Statistics sold in the month of June and July. The records are as follows:

Subject	Month	
	June	July
Mathematics	16	15
Statistics	30	12

If the selling price of 1 book of Mathematics is Rs. 150 and 1 book of Statistics is Rs. 120, then by using matrix multiplication, find the total selling price of the books for June and July month separately.

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