



॥ विद्या सर्वस्य भूषणम् ॥

PRABODHAN EDUCATION SOCIETY'S

Vidya Prabodhini College of Commerce, Education, Computer & Management
Vidyanagar, Alto-Parvari, Goa

SEMESTER END EXAMINATION - OCTOBER/NOVEMBER 2017 (Regular/Repeat)

Sub: Commercial Arithmetics - I (As Per CBCS)

Semester: I

M. Marks: 80

M. Time: 2 hrs.

INSTRUCTIONS: 1. All questions are compulsory however internal choice is available.

2. Use of calculator is strictly forbidden.

3. Figures to the right indicate marks allotted.

4. There are 4 main questions each carrying 20 marks.

5. You may answer randomly but every main question attempted should be answered serially.

Q1. Attempt the following.

(4 x 5 =20)

- Construct the truth tables for $\sim q \rightarrow [(p \wedge q) \wedge p]$ and $(p \leftrightarrow \sim q) \rightarrow (q \leftrightarrow \sim p)$.
- If $5({}^n P_4) = 3({}^{n+1} P_4)$, then find n.
- If the 8th term of an A.P is 19 and its 16th term is 35, find its nth term.
- If $2 \begin{bmatrix} 5 & 2 \\ -3 & 4 \end{bmatrix} + 3 \begin{bmatrix} 1 & 0 \\ 4 & -4 \end{bmatrix} - 2X = 0$, find the matrix X.

OR

Q1. Attempt the following.

(4 x 5 =20)

- Examine whether the statement " $[(p \rightarrow \sim q) \vee (\sim p)] \leftrightarrow q$ " is tautology, contradiction or neither.
- A council consist of 10 members, 6 belonging to party A and 4 belong to party B. In how many ways can a committee of 5 be formed so that the members of the party B are in majority?
- Is the series -3, 1, 5, 9, an A. P? If yes, then find its nth term T_n and also find S_{12} .
- For what matrix D, the equation $2A - 3B + C - D = 0$ is true, where

$$A = \begin{bmatrix} 1 & 7 \\ 3 & -1 \\ -3 & 2 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 1 \\ 5 & -4 \\ 2 & -5 \end{bmatrix}, \quad C = \begin{bmatrix} 0 & 5 \\ -3 & 2 \\ 2 & 1 \end{bmatrix}$$

Q2. Attempt the following.

(4 x 5 =20)

- In a consumer-preference survey of an item, 15 were found to use Brand A, 20 were found to use Brand B, 5 were found to be in the habit of using both brands A and B. Find the number of consumers using at least one of the two brands of the item.

- b) A student council committee of 4 is to be selected from 7 BCOM students and 6 BABED students. In how many ways can this be done so that at least 2 students from BABED are in the committee?
- c) Find the amount and the compound interest on ₹ 2000 for 2 years at 10% calculated on yearly basis?
- d) A person repays his interest-free loan from a friend in 15 monthly installments, such that; each installment is less than the previous installment by ₹ 100. If the first installment was ₹ 2000, find out his last installment, and calculate his loan amount.

OR

QII. Attempt the following.

(4 x 5 =20)

p) If $A = \{1, 2, 4, 5, 6\}$ and $B = \{2, 4, 6, 8, 9\}$ are subsets of the universal set $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ is the universal set, verify that

i) $B^C - A^C = A - B$

ii) $B - A = B \cap A^C$

q) Find n, if ${}^{2n}P_3 = 36({}^nP_2)$.

r) Find the amount received when a sum of ₹ 10,000 is invested at 8% for 3 years, if the interest is compounded half yearly? (Given that $(1.04)^6 = 1.26$)

s) The rainfall in a city for 7 days was 383 mm. if the rainfall per day doubled that of the previous day, in the above period, find the rainfall on the first day and the last day.

Q3. Attempt the following.

(4 x 5 =20)

a) Check whether the statements $(p \wedge \sim q) \vee q$ and $(q \wedge \sim p) \vee p$ are equivalent.

b) If $A = \{1, 3, 4, 5\}$, $B = \{2, 4, 6, 8\}$, $C = \{1, 4, 6, 7, 9\}$ and the universal set $X = \{1, 2, 3, \dots, 10\}$, then verify that i) $A \cap (B \cap C) = (A \cap B) \cap C$ ii) $(A \cup B)^C = A^C \cap B^C$

c) What is better, a simple interest of 20% for 5 years or a compound interest of 18% calculated quarterly for 4 years? (Take $P = 100$)(Given that $(1.045)^{16} = 2.02$)

d) Find the sum $5 + 55 + 555 + \dots$ upto n terms.

OR

QIII. Attempt the following.

(4 x 5 =20)

p) State whether the statement $(p \rightarrow q) \wedge [(\sim p \vee q) \leftrightarrow q]$ is tautology or not.

q) Let $X = \{1, 2, 3, \dots, 9, 10\}$ be a universal set. If $A = \{2, 3, 4, 7, 8\}$, $B = \{1, 2, 5, 7, 8\}$ and $C = \{4, 6, 8, 9, 10\}$ then verify that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

r) Sunil borrowed ₹ 2000 at simple interest of 10% for 3 years and invested the same amount for compound interest of 9% to be calculated quarterly for 3 years. Is he benefitted? (Given that $(1.03)^{12} = 1.43$)

s) Find the sum $9 + 99 + 999 + \dots$ upto n terms.

Q4. Attempt the following.

(4 x 5 =20)

- a) How many different numbers can be formed using all the digits of the number
(i) 737137 (ii) 8488448
- b) How much time will the principal of ₹ 400 will take, to be ₹ 1000, at the simple interest of 12.5% per annum?

c) Solve the system of equations using Cramer's rule

$$4x + 3y = -2$$

$$2x - 3y - 8 = 0$$

d) A person takes a friendly loan from his friend and promises to pay him regularly a sum of ₹ 800 at the end of each month, for a period of 1 year. Assuming the rate of interest at 12% compounded monthly, find the amount received by his friend at the end of the year, using the ordinary annuity principle. (Given that $(1.01)^{12} = 1.13$)

OR

QIV. Attempt the following.

(4 x 5 =20)

p) Find the value of ${}^{10}C_6 + {}^{10}C_5 - {}^9C_6 - {}^9C_5$.

q) In how much time will the simple interest on ₹ 12000 at 11% p.a will be 3960?

r) Find the amount for the ordinary annuity with periodic payment as ₹ 500, at the rate of interest 15% p.a, for 3 years, where the period of payments is half-yearly. (Given that $1.075^6 = 1.54$)

s) Evaluate $\begin{vmatrix} x+y & x-y \\ x-y & x+y \end{vmatrix}$