Goa Vidyaprasarak Mandal's
GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND ECONOMICS PONDA GOA
B.COM. CBCS (SEMESTER I) REPEAT EXAMINATION
NOVEMBER 2023

COMMERCIAL ARITHMETIC

Duration: 2 hours **Marks: 80**

Instructions: 1. Attempt all questions
2. Figures to the right indicate full marks.

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

a) Construct the truth table for $(p \wedge q) \vee \sim p$.
b) What will be the amount of ₹ 15500 in 6.5 years at the rate of simple interest of 6% per annum?
c) If ${}^{n}P_3 = {}^{n}P_4$, find n.
d) Find the sum 3 + 33 + 333 + ... up to n terms.
e) If $A = \begin{bmatrix} -2 & 3 \\ 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ 3 & 2 \end{bmatrix}$, find the matrix X such that 3A+ 5B+2X=0.

OR

Q.I Attempt the following: **(5 x 4 = 20)**

p) Verify using truth table that $\sim (p \wedge q) = (\sim p) \vee (\sim q)$.

q) Compute the amount of ₹ 6000 after 4 years at 6% per annum simple interest.

r) A 4 digits number is to be formed using the digits from 1 to 5.
How many such numbers can be formed if the repetition of digits in the number is not allowed.

s) If for an A.P. $t_{10} = 16$, find S_{19}.

t) If $A = \begin{bmatrix} 1 & -2 \\ 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 3 & 1 \end{bmatrix}$, find the matrix 4A- 3B+I, where I is the identity matrix of order 2.

Q.2 Attempt the following: **(5 x 4 = 20)**

a) Find the amount of an ordinary annuity of ₹ 10400 p.a. for 4 years at the rate of interest of 8% per period.

b) Using Cramers's rule solve the following equations
$2x + 3y = -4$ and $3x - 5y = 7$.

c) If $n(A) = 5$, $n(B) = 7$ and $n(A \cap B) = 2$. Find $n(A \cup B)$.

d) In a G.P. the fourth and seventh terms are 24 and 81 respectively. Find the first term and common ratio.

e) If $4({}^{n}P_4) = {}^{n}P_5$, find the value of n.

OR

Q.II Attempt the following: **(5 x 4 = 20)**

p) A person is promised the final amount of a half yearly ordinary annuity with periodic payment of 1500, the duration of the annuity being 3 years and the rate of interest is 10% to be compounded half-yearly. Find the present value of the annuity.

q) Using Cramer's rule, solve the following equations.
$3x + y = 72$ and $3x - 4y = 0$.

r) Use Venn diagram to show that for any sets A and B, $A \cup B = A \cup (B - A)$.

s) The third term of a G.P. is 12 and the sixth term is 96, find its first term and the common ratio.

t) A committee of 5 members is to be formed out of 6 men and 4 women. In how many ways committee can be formed to have at least 4 men?

Q 3. **Attempt the following:** **(5 x 4 = 20)**

a) Verify that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology or not.

b) A and B are two subsets of the universal set X such that $n(X)=99$, $n(A^c)=80$, $n(B^c) = 85$ and $n[(A \cap B)^c] = 94$, find $n(A \cup B)$.

c) Ajit invested in an annuity for 4 years at the rate of interest of 8% compounded half-yearly. If he received ₹ 27642.68 as the maturity value, What is his periodic payment?

d) If ${}^{n}C_r = 120$ and ${}^{n}P_r = 720$, find the value of n and r.

e) Find the 3 terms of an A.P. whose sum is 15 and the product is 80.

OR

Q III. **Attempt the following:** **(5 x 4 = 20)**

p) Check if statement **(p ∨ q) ∧ ~ (p∨ q)** is a contradiction or tautology.

q) Find x if $\begin{vmatrix} x & 2 & x+3 \\ 3 & 5 & 8 \\ 1 & 6 & 12 \end{vmatrix} = 0$

r) Find the amount of an annuity of ₹ 6000, payable at the end of each quarter for 2 years, the interest rate being 8%, compounded quarterly.

s) A club has 5 girls and 7 boys. If 4 persons out of these are to be selected, find the total number of choices if 1) there is no restriction on gender 2) 3 boys and 1 girl is to be selected.

t) A sum of `₹ 72800 is to be paid in 6 monthly instalments, such that each instalment is three times the previous instalment. Find the first and the last instalment.

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

a) Punam takes a friendly loan from his friend and promises to pay him regularly a sum of ₹ 1000 at the end of each month, for a duration of 1 year. Assuming the rate of interest at 10% compounded monthly, find the amount received by his friend at the end of the year, using the ordinary annuity principle.

b) How many words can be formed from letters of the word COMPUTER, so that it begins with a consonant and end with a vowel.

c) Mario invest ₹ 6000 in the first month and increases his investment by ` 1000 in every subsequent month. Calculate his total investment at the end of 2 years.

d) The compound interest payable quarterly at 10% per annum for 2 years is ₹ 500. Find the principle value.

e) If M = $\begin{bmatrix} 1 & -2 \\ 2 & 0 \end{bmatrix}$ find the matrix M^2 - 3M + I.

OR

Q IV **Attempt the following:** **(5 x 4 = 20)**

p) Minaxi is promised the final amount of a half yearly ordinary annuity with periodic payment of ₹ 2000, the duration of the annuity being 2 years and the rate of interest is 5% to be compounded half-yearly. Find the present value of the annuity.

q) From 4 professors and 6 students, a committee of 4 is to be formed. In how many ways this can be done, if the committee contains
   i) Exactly 3 professors
   ii) At least 3 professors.

r) Find the sum of all the numbers between 100 and 300, which are exactly divisible by 5.

s) Find the sum borrowed by Rahul from a bank on compound interest of 5% per year, to be calculated annually, if he had to pay back ₹ 26,460 after 2 years.

t) If $A = \begin{bmatrix} 1 & -1 \\ 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix}$, find the matrix $A^2 + B^2$

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