

Goa Vidyaprasarak Mandal's
GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND
ECONOMICS, PONDA- GOA
B.COM. CBCS (SEMESTER - I) EXAMINATION, OCTOBER 2019
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 truth table for $\sim (\sim p \wedge \sim q)$.
- b) A certain sum on simple interest becomes ₹ 2400 in 2 years and ₹ 2600 in 3 years. Find the principal and rate of simple interest per annum.
- c) A college office has 7 men and 5 women, if the committee of 4 members out of these are to be selected, find the total number of ways selecting the committee if
 - i) 3 men and a woman is to be selected
 - ii) There is no restriction on gender.
- d) Find the sum of all numbers from 100 to 300 which are exactly divisible by 5.
- e) If $A = \begin{bmatrix} 3 & 1 \\ 1 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 5 \\ 3 & 2 \end{bmatrix}$, find the matrix X such that $3A + 5B - X = 0$.

OR

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

- p) Construct the truth table for $(p \wedge q) \wedge \sim(p \vee q)$.
- q) Find compound interest on ₹ 2400 at 8% annually for 2 years if
 - i) the interest is calculated half yearly
 - ii) the interest is calculated monthly.
- r) A 3 digit number is to be formed using the digits from 0 to 9.
How many such numbers can be formed if the repetition of digits in the number is allowed.
- s) If for an A.P. $t_{26} = 103$, find S_{51} .
- t) If $M = \begin{bmatrix} 1 & -2 \\ 2 & 0 \end{bmatrix}$ and $N = \begin{bmatrix} 2 & 0 \\ 3 & 1 \end{bmatrix}$, find the matrix $3M - 2N + I$, where I is the identity matrix of order 2.

Q.2 Attempt the following:

(5 x 4 = 20)

- a) Ajit received 8240 as maturity amount at the end of 2 years on his annuity, the period of payment being end of each year. Find his yearly installment if the rate of interest was 6% compounded on yearly basis.
- b) Using Cramer's rule solve the following equations
 $3x + 5y = 4$ and $x - 4y = 2$.
- c) Let $X = \{x/x \text{ is positive integer less than } 10\}$ be the universal set.
 $A = \{2, 4, 7, 9\}$ and $B = \{1, 3, 5, 7\}$. Verify $(A \cap B)^c = A^c \cup B^c$.
- d) Find 3 numbers in G.P. whose sum is 26 and the product is 216.
- e) If ${}^n P_5 = {}^n P_6$, 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 ₹ 1600, 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.
- q) Solve the following equations using Cramer's rule,
 $2x + 3y = 5$, $3x - 5y = 4$.
- r) The universal set $X = \{1, 2, 3, 4, 5, 6, 7, 8\}$. $A = \{2, 5, 7\}$ and $B = \{3, 5, 7, 8\}$. show that
 $A \cup B = A \cup (B - A)$.
- 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 3 women?

Q 3. Attempt the following:

(5 x 4 = 20)

- a) Prove that $[(p \rightarrow q) \wedge \sim q] \rightarrow \sim p$ is a tautology.
- b) In a group of 400 people, 250 speaks English and 200 speaks konkani. Using Venn diagram find the number of people speaking both the languages.
- c) Certain bank gives interest at 8.75% compounded quarterly, another bank comes up with a new scheme of simple interest at the rate of 10% per annum. Calculate which scheme is more beneficial to the customer, for the investment of 4 years.
- d) If ${}^n C_r = 120$ and ${}^n P_r = 720$, find the value of n and r.
- e) If for an A.P. fifth term is 35 and ninth term is 59, find its n^{th} term.

OR

Q III. Attempt the following:

(5 x 4 = 20)

p) Check whether the $(p \wedge q) \wedge \sim (p \vee q)$ is a contradiction or tautology .q) Find x if
$$\begin{vmatrix} x & 2 & 1 \\ 3 & 0 & 1 \\ 4 & 5 & -1 \end{vmatrix} = 0$$

r) Amin borrows ₹ 2000 from Sachin at compound interest of 10% per annum, to be compounded on quarterly basis. What amount is due to him after 9 month? Also state his interest.

s) 7 cards are selected from a pack of 52 cards. How many selection (i) will have exactly 3 diamonds and 4 hearts. (ii) will not contain any spade.

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

Q 4. Attempt the following:

(5 x 4 = 20)

a) Vishal 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 duration of 1 year. Assuming the rate of interest at 11% compounded monthly, find the amount received by his friend at the end of the year, using the ordinary annuity principle.

b) 5 students including 2 players and 3 singers seat in a line for a photograph. How many different arrangements can be done, if (i) any body can sit anywhere (ii) players can occupy end seat.

c) Ajay invests ₹ 10,000 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) Find the principal, if the compound interest payable quarterly at 12% per annum for 2 years is ₹ 420.

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

OR

Q IV. Attempt the following:

(5 x 4 = 20)

p) Find the present value of an ordinary annuity of ₹ 3500 p.a. for 3 years at 12% to be compounded half-yearly.

- q) From 5 professors and 7 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) For a Geometric Progression third term is 36 and sixth term is 972, find T_8
- 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 $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$, find the matrix $A^2 + 2A$.

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