BCOM I SEMESTER END EXAMINATION , OCTOBER 2018

CORE COURSE 4 : COMMERCIAL ARITHMETIC-I

Duration: 02 Hours **Total Marks :80**

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.

Q 1) **Answer the following**: $(\mathbf{5 \times 4 = 20})$

a) Check if the following statements are logically equaivalent:

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

b)Find the compound interest on Rs. 40000 invested for 3 years at 11.4 % p. a. rate of interest compounded annually.

c) In how many different ways can the letters of the word "**SPRINKLE**" be arranged so as to begin with **S** and end with **E**?

d) Find S_{50} for the following **Arithmetic Progression** (**AP**):

$20, 34, 48, 62, \ldots$

e)If A and B are 2 matrices given by $A = \begin{bmatrix} 7 & 5 \\ 9 & 6 \\ 10 & 18 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 0 \\ 3 & 15 \\ 2 & 22 \end{bmatrix}$, then find

$5A$ and $A - B$.

OR

Q I) **Answer the following**: $(\mathbf{5 \times 4 = 20})$

p) Draw the truth table for $(q \rightarrow p) \rightarrow (q \leftrightarrow \sim p)$.

q) A loan of Rs. 30000 is to be returned in 3 monthly instalments at the rate of 12%p. a. compounded monthly. Find the **EMI** using Reducing Balance Method.

r) How many 3 digit even numbers can be formed using the digits 5,6 and 7 ? (**Repetition of digits is allowed**)

s)Find S_7 for the following **Geometric Progression**(**GP**):

$10, 60, 360, \ldots$

t) If A , B and C are 3 matrices given by $A = \begin{bmatrix} 1 & 5 \\ 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 20 & 1 \\ 4 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 12 \\ 1 & 2 \end{bmatrix}$, then find matrix $A(B + C)$ and A^T .

Q 2) Answer the following: $(\mathbf{5 \times 4 = 20})$

a) Stera obtained a loan Rs. 67000 at 12% p. a. flat rate of interest to be paid back in monthly instalments over a period of 4 years. How much is the value of each **EMI**?

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

$3x + 4y = 23$

$2x + 7y = 24$

c) If $X = \{40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50\}$ is the Universal set ,

$A = \{42, 43, 44, 47, 48, 50\}$ and $B = \{40, 43, 45, 48, 49\}$ are two sets ,

then find $A \cup B$, $A \cap B$, B' and $A - B$.

d) If the investment done by Preeti forms **Arithmetic Progression**(**AP**) and value of her 19^{th} investment is Rs. 220 and 6^{th} investment is Rs. 90, then find the value of her 2^{nd} investment.

e) In how many different ways can 4 chocolates be chosen from a box of 43 chocolates?

OR

Q II) Answer the following: $(\mathbf{5 \times 4 = 20})$

p)Find the future value of the following ordinary annuity:
Rs. 48900 a year for 4 years at 12% p. a. compounded annually.

q) i) If $A = \begin{bmatrix} 15 & 23 & 20 \\ 7 & 3 & 4 \\ 8 & 18 & 8 \end{bmatrix}$, then find C_{22} .

ii) If $\begin{bmatrix} \mathbf{x} + 5 & 12 \\ 2\mathbf{y} & 18 \end{bmatrix} = \begin{bmatrix} 25 & 12 \\ 100 & 18 \end{bmatrix}$, then find the value of **x** and **y**.

r) If X is the Universal set given by $X = \{5,10, 15, 20, 25, 30 , 35, 40, 45, 50, 55, 60\}$,
$A = \{5, 15, 20, 45, 50, 60\}$ and $B = \{15,30, 45, 60\}$ are two sets , then
verify $(A \cap B)' = A' \cup B'$.

s) Sana invests Rs. 10 on the first day and increases her investment 5 times every succeeding day. Find the value of the total investment done by her at the end of 6^{th} day.

t) In how many different ways can the letters of the word **"DEPOSIT"** be arranged such that the vowels always appear together?

Q 3) Answer the following: $(\mathbf{5 \times 4 = 20})$

a) Prove that the following statement is a Contradiction:
$(p \wedge q) \wedge (\sim p \wedge \sim q)$

b) In a survey of people of certain area , it was found that 450 of them have Aadhar card, 650 have EPIC card and 300 have both Aadhar card and EPIC card.

i)Find the number of people in that area who have either Aadhar card or EPIC card.

ii)Find the number of people in that area who have only Aadhar card.

c) Find the simple interest on Rs. 73700 invested for 7 years at 5% p. a. rate of interest .

d) How many different numbers can be formed using all the digits of the number **5116666**?

e) Find t_{26} and t_{41} for the following **Arithmetic Progression**(**AP**):
55, 59,63 ,67, ...

OR

Q III) **Answer the following**: $(\mathbf{5 \times 4 = 20})$

p) Check the validity of the following argument:
$p \rightarrow q, \sim p \vee q$ therefore $\sim q$

q) If $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ is the Universal set ,
$A = \{1, 3, 7, 8, 9\}$ and $B = \{x | x \in X, x^2 - 15x + 54 = 0\}$ are two sets , then check if $A - B = A \cap B'$.

r) Find the present value of Rs. 1256 required 5 years from now if the compound interest rate is 8% p. a.

s) In a box , there 9 pens and 23 pencils. If 7 items are randomly chosen from this box, then how many of the selections will have minimum 6 pens?

t) If for a **Geometric Progression**(**GP**), $a = 5$ and $r = 8$, then find t_7 and t_4.

Q 4) **Answer the following**: $(\mathbf{5 \times 4 = 20})$

a)Find the effective rate of interest equivalent to the nominal rate of 20% p. a. when compounded quarterly .

b) Find the value of i) 9!

ii) ${}^{18}P_2$

c) If for a **Geometric Progression** (**GP**), $t_5 = 25088$ and $t_8 = 1605632$, then find the value of r .

d) Find the present value of an annuity of Rs. 6000 payable at the end of each year for 3 years the interest being 6% p. a. compounded annually.

e) A wholesaler supplies onions to retailers A and B in bags of 5 kg and 10 kg as follows:

	5kg	10kg
Number of bags supplied to Retailer A	30	60
Number of bags supplied to Retailer B	25	65

The price of 5kg and 10kg onion bags are Rs. 150 and Rs. 300 respectively. Find the total amount paid by retailer A and retailer B respectively to the wholesaler using matrix multiplication.

OR

Q IV) Answer the following: **$(5 \times 4 = 20)$**

p) At what rate of interest will Rs. 34000 yield Rs. 14960 as Simple Interest in 8 years.

q) In a fruit basket there are 30 fruits out of which 12 are spoilt. If 6 fruits are randomly chosen from the fruit basket, then how many of the selections will have exactly 2 spoilt fruits?

r) If for an **Arithmetic progression(AP)** , a $= 12$ and $t_{40} = 324$, then find the value of d.

s) Find the future value of Rs. 1210 after 5 years if the compound interest rate is 4.25% p. a.

t) Find the value of $\mathbf{x}$ if matrix $A = \begin{bmatrix} 6 & 15 & \mathbf{x} \\ 10 & 30 & 12 \\ 2 & 5 & 3 \end{bmatrix}$ is Singular.
