Enrollment No......................................

Faculty of Management Studies
End Sem Examination Dec 2024
MS3CO32 Elementary Mathematics & Statistics

Programme: BBA   Branch/Specialisation: Management

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	If $x:6 = 55:11$ then value of x is_____.	1	02	01	02	
		(a) 30 $\quad$ (b) 33					
		(c) 34 $\quad$ (d) None of these					
	ii.	Formula of Simple Interest is_____.	1	01	01	01	
		(a) $P + R + T$ $\quad$ (b) $\frac{PRT}{100}$					
		(c) PRT $\quad$ (d) None of these					
	iii.	If $A = \{a, e, i, o, u\}$ and $B = \{a, b\}$ then value $(A \cap B)$ is_____.	1	02	02	02	
		(a) $\{ a, e, i, o, u, b\}$ $\quad$ (b) $\{a, e, b\}$					
		(c) $\{a\}$ $\quad$ (d) None of these					
	iv.	$A = \{x : x \neq x\}$ is-	1	02	02	01	
		(a) Singleton set $\quad$ (b) Empty set					
		(c) Finite set $\quad$ (d) None of these					
	v.	Which of the following is example of reflexive relation?	1	02	01	01	
		(a) $\{(1, 1), (2, 3), (3, 2)\}$					
		(b) $\{(1, 2), (2, 3), (3, 1)\}$					
		(c) $\{(1, 1), (2, 1), (1, 2)\}$					
		(d) None of these					
	vi.	Let $f(x) = 2 + x$ then value $f(-1)$ is-	1	03	03	04	
		(a) 1 $\quad$ (b) 0 $\quad$ (c) 2 $\quad$ (d) None of these					
	vii.	Value of ${}^4P_4$ is-	1	03	05	04	
		(a) 22 $\quad$ (b) 24 $\quad$ (c) 26 $\quad$ (d) None of these					

viii. Value of $\frac{7!}{6!}$ is - **1** 03 05 04

(a) 1   (b) 7   (c) 6   (d) None of these.

ix. General formula of arithmetic mean is- **1** 02 01 01

(a) $\frac{a+b}{2}$ (b) $a + b$

(c) $\frac{a}{2}$ (d) None of these

x. Geometric Mean of 'x' and $\frac{1}{x}$ is- **1** 03 01 01

(a) 1   (b) ± 1 (c) -1   (d) None of these

Q.2   i. Evaluate $\{15 \times 32 \div 2 \times 5\} \div 75$. **2** 05 07 04

ii. Three students contested an election and received 1000, 5000 and 10000 votes respectively. What is the percentage of the total votes the winning student gets? **3** 03 03 03

iii. The ratio of ages of Abha and her mother is 2:5. at the time of Abha's birth her mother age was 27 years. Find the present ages of Abha and her mother. **5** 03 02 03

OR   iv. What sum of money will produce Rs.28,600 as an interest in 3 years and 3 months at 2.5% per annum simple interest? **5** 03 02 03

Q.3   Attempt any two:

i. Define set and its types (any four). **5** 01 01 01

ii. Draw the Venn diagram for the following- **5** 02 02 03

$(a)\ (A \cup B) \cap (A \cup C)$

(b) $A' \cap (C - B)$

iii. If A = {a, b, c, d, e}, B = {a, c, e, g} and C = {b, e, f, g} then prove that- **5** 03 04 03

(a) A ∩ (B – C) = (A ∩ B) – (A ∩ C)

(b) A - (B ∩ C) = (A - B) ∪ (A - C)

Q.4   Attempt any two:

i. Determine whether the following relation R on set A are reflexive, symmetric and transitive, where **5** 03 01 02

A= {2,3,4} and R= {(2,2), (3,3), (4,4), (2,3), (3,4)}.

ii. A publisher house finds that the production of cost directly attributed to each book is Rs.30 and that the fixed cost are Rs.15,000. If each book can be sold for Rs.45 then determine - **5** 03 02 03

(a) The cost function

(b) The revenue function

(c) The break-even point

iii. Define Function. Write any four types of function with example. **5** 02 01 01

Q.5   i. A student has 10 text books and 8 other books. In how many ways can he selected 4 text books and 3 other books? **4** 03 03 03

ii. Find the middle term in the expansion of- **6** 05 05 04

(a) $\left(x^2 - \frac{1}{x}\right)^6$

(b) $\left(x - \frac{1}{x}\right)^{11}$

OR   iii. By using binomial theorem, expand $(x + 2a)^5$. **6** 04 05 04

Q.6   i. Find the 21st term of sequence $25, 30, 35, ...$ **4** 04 02 03

ii. The third term of a G.P. is 24 and the sixth term is 192. Find the tenth term. **6** 03 02 03

OR   iii. Find the sum of the following Geometric Series to infinity: **6** 05 03 03

$$1 - \frac{1}{2} + \frac{1}{4} - \ ...\ ...$$

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Solution

Marks

Faculty of Management studies

End Sem Examination Dec-2024

"MS3C032"

Elementary Mathematics & Statistics

Programme: BBA (BA)

Q:1 MCQS

i) (a) 30 |1

ii) (c) PRT/100 |1

iii) (C) $\{a\}$ |1

iv) (a) singleton |1

v) (d) $\{(1,1)(2,1)(1,2)\}$ None of these |1

vi) (a) 1 |1

vii) (b) 24 |1

viii) (b) 7 |1

ix) (a) $a+b/2$

x) (b) ± 1

Marks

Q:2 (i)

$$15 \times 32 \div 2 \times 5$$

By "BODMAS" Rule

1

$$15 \times \frac{32}{2} \times 5$$

$$\Rightarrow 15 \times 16 \times 5$$

1

$$= 15 \times 80$$

$$= \boxed{1200}$$

ii). Three students contested an election and recivuy.
1000, 5,000 and 10000 Votes

The total vote is 16000.

The persentage of student 1

1

$$\left(\frac{1000}{16000} \times 100 \right) \% = \frac{100}{16} \%$$

The student 2 persentage

$$\left(\frac{5000}{16000} \times 100 \right) \% = \frac{500}{16} \%$$

The student 3 persentage $\frac{10000}{16000} \times 100 = \frac{10}{16} \%$

Marks

The student-2 will be winner.

———————— x ————————

Q:2 (iii) Given the Ratio of ages of Abha and her mother is

2n and 5n (Assume)

1

According to the problem at the time of Abha's birth her mother age was 27

1

$$5n = 2n + 27$$

$$3n = 27 \longrightarrow \boxed{n = 9}$$

1

The present ages of Abha and her mother is

2

Abha $\rightarrow 2n = 2 \times 9 = 18$ year

Mother $\rightarrow 5n = 5 \times 9 = 45$ year

———————— x ————————

Q:2 (iv)

Given $p = 28600/-$

1

$R = 2.5\%$ per annum

$T = 3$ year 3 month

$= 3\frac{1}{4} = \frac{13}{4}$ year

Marks

$$\text{Simple interest} = \frac{P \times R \times T}{100}$$

3

$$= \frac{28600 \times \frac{13}{4} \times 2.5}{100}$$

$$= 2323.75$$

——————→ x ——————

Q:3.(i) Define

Set:- A set is an collection
of Unordered well defined collection
of finite number of objects is
called set. it is denoted by The
symbol of capital letter A to z and
all the element of the finite sets inside
in the { } curly bracket.

2

Types:

① finite set: A set in
which finite number of element is
called finite set

ex A = {2,4,6,8,10}

1

Marks

② Null set. A set in which no any element are present (empty) is called Null set. It is denoted by ϕ

$$\phi = \{ \quad \}$$

③ disjoint set: If A and B are two finite sets Then A∩B = ϕ is called disjoint

Ex A = $\{ 2, 5, 7 \}$

B = $\{ 8, 9 \}$

A∩B = ϕ.

4) Difference of two set: The Difference of Two set A−B in which falling after subtraction only Set A not B.

∀ x∈(A−B) ⟹ x∈A and x∉B

Ex A = $\{ 1, 2, 3, 4, 5 \}$

B = $\{ 5, 6 \}$

A−B = $\{ 1, 2, 3, 4 \}$

Marks

Q:3 (ii)

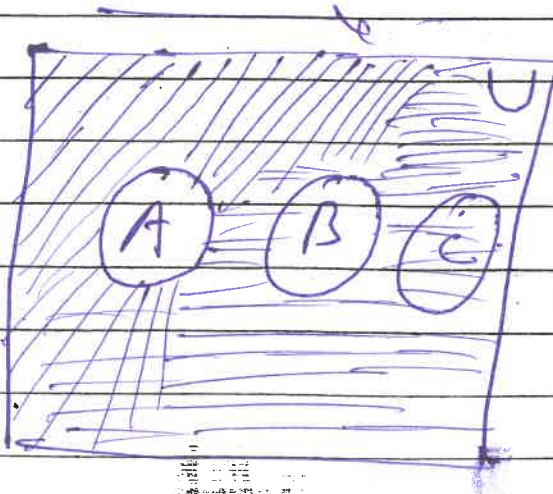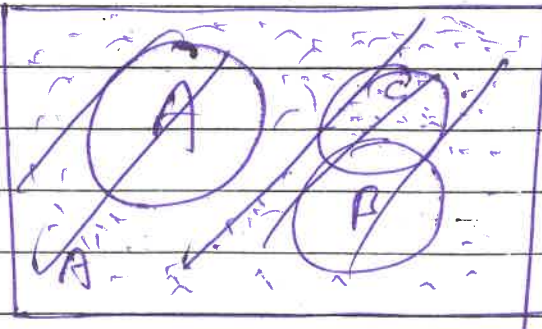Venn diagram :- The pictorial representation of finite no. of set.

1

(a) $(A \cup B) \cap (A \cup C) = A \cup (B \cap C)$

2

identical sets A, B and C are taken for drawing Venn - diagrams

2

(b) $A' \cap (C - B)$

Marks

Q: 3 (iii)

if $A = \{a, b, c, d, e\}$

$B = \{a, c, e, g\}$, $C = \{b, e, f, g\}$

(a) to show that -

$A \cap (B-C) = (A \cap B) - (A \cap C)$ 1

L.H.S

$B-C = \{a, c\}$

$A \cap (B-C) = \{a, c\}$ 2

R.H.S $A \cap B = \{a, c, e\}$

$A \cap C = \{e\}$

$(A \cap B) - (A \cap C) = \{a, c\}$

                              prove

b) $A - (B \cap C) = (A-B) \cup (A-C)$

$B \cap C = \{e, g\}$ $A-B = \{b, d,\}$ 2

$A-C = \{a, c, d\}$

L.H.S $A - \{B \cap C\} = \{a, b, c, d\}$

R.H.S

$(A-B) \cup (A-C) = \{a, b, c, d\}$ prove

Q: 4 (i) The following Relation R are
Reflexive, symmetric and transitive
on the set A = {1,2,3,4}

Marks

$R = \{ (2,2), (3,3), (4,4), (2,3), (3,4) \}$

① Reflexive : ∀ x∈A Then

$(x,x) ∈ R \implies (x,x) ∈ R$

$(2,2) ∈ R \implies (2,2) ∈ R$

$(3,3) ∈ R \implies (3,3) ∈ R$

$(4,4) ∈ R \implies (4,4) ∈ R$

Hence R is reflexive on A.

② Symmetric :- ∀ x,y∈A

$x R y \implies y R x$

$(x,y) ∈ R \implies (y,x) ∈ R$

$(2,3) ∈ R \implies (3,2) \notin R$

$(3,4) ∈ R \implies (4,3) \notin R$

Clearly, R is not symmetric on A.

③ Transitive → ∀ x,y,z ∈ R

Marks

xRy & yRz $\implies$ xRz

$(x,y) \in R$ & $(y,z) \in R$ $\implies$ $(x,z) \in R$ 1

$(2,3) \in R$ & $(3,4) \in R$ $\implies$ $(2,4) \notin R$

R is not transitive on A.

$\longrightarrow \times \quad \underline{\qquad}$

Q:4 (ii) In The given problem, production
cost of a book is Rs 30 if There
are x books, Therefore,

Variable cost $=$ price $\cdot$ quantity   1

$$V(x) = 30x \quad \text{---①}$$

fixed cost function

$$C(x) = f(x) + V(x) \qquad 1$$

$$= 15,000 + 30x$$

$$\text{---②}$$

Revenue function. Let x be No. of
units of books sold if each book
is sold at a rate of Rs $45-$ 1

$$R(x) = 45x$$

Marks

profit Function -

$$p(x) = R(x) - C(x)$$

$$p(x) = 50x - (15000 + 30x)$$

$$p(x) = 20x - 15000$$

Break - Evenpoint.

$$p(x) = 0$$

$$20x - 15000 = 0$$

$$x = 15000/20$$

$$\boxed{x = 750 \ R_s}$$

Cost Function

$$C(x) = 15000 + 30 \times 750$$

$$C(x) = 15000 + 22,500$$

$$C(x) = R_s \ 37,500$$

———o———

Marks

Q:4 (iii) Define function :-

function is The relationship between Two Variables, for example $y = f(x)$ where y is The dependent Variable and x is independent Variable. In mapping form, we can define function as :-

2

let A and B be Two non empty sets Then

$$f : A \xrightarrow{\text{into}} B$$

Where A is domain and B is Codomain of f.

Types -

i) Algebraic function :- An algebraic function which consists of a finite number of terms involving powers and roots of The Variable x and The mathematical operations like that addition, Subtraction, multiplication and division.

1

Ex: $f(x) = x^3 + 6x^2 - 5x + 4$

ii) Transcendental function: — The function which are not algebraic are called transcendental function in other words The functions which involved trignometic exponential, Logarithm etc.
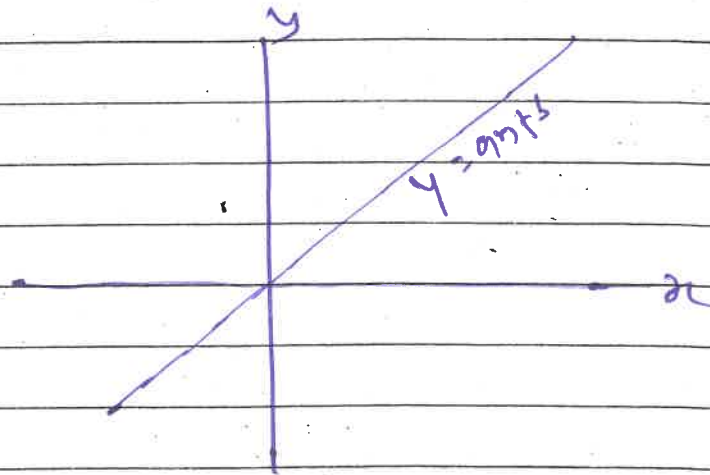
Marks

Ex: $f(x) = x \sin x + x^2 \log x$

(iii) linear function:- A function $f(x)$
defined by
$$f(x) = ax + b$$

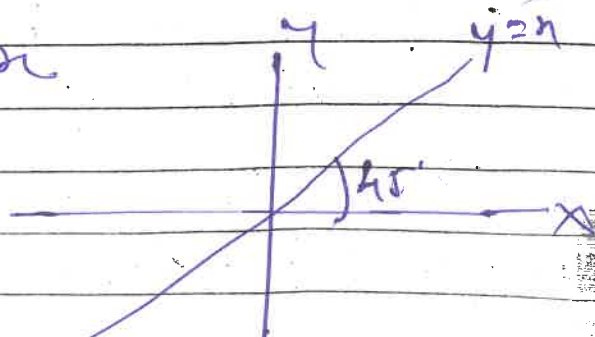Where a and b are constants and x, y are variables is called linear func^n. Its graph is always a straight line

(iv) Identity function:- it is special
case of linear function
with $a = 1$ and $b = 0$

$$y = ax + b \quad (a=1, b=0)$$
$$y = x \quad (y = f(x))$$
$$f(x) = x$$

Marks

Q:5 (i) Apply formula of combination

$$n_{c_r} = \frac{\lfloor n}{\lfloor n-r \cdot \lfloor r}$$

1

given that,

10 test books and 8 other books.

In how many ways can be selected 4 test books and 3 other books are.

1

$$10_{c_4} \times 8_{c_3}$$

$$2 \quad \frac{\lfloor 10}{\lfloor 6 \cdot \lfloor 4} \times \frac{\lfloor 8}{\lfloor 5 \cdot \lfloor 3}$$

2

$$= 210 \times 56$$

$$= 11760 \text{ ways}$$

ii) Q:5 (ii) Find the middle term in the expension -

a) $\left(x^2 - \frac{1}{x}\right)^6$ to compair

$(a+b)^n$ where $a = x^2$ $b = \frac{-1}{x}$ | 1

$n = 6$ (even)

The only one middle term.

$$\frac{n}{2} + 1 = \frac{6}{2} + 1 = 4$$

$\therefore$ $T_{r+1} = n_{c_r} \, a^{n-r} \, b^r$ | 3

$$T_{3+1} = 6_{c_3} (x^2)^{6-3} \left(\frac{-1}{x}\right)^3$$

$$= -20 \, x^6 \cdot \frac{1}{x^3}$$

$$\boxed{T_4 = -20 x^3}$$

b) $\left(x - \frac{1}{x}\right)^{11}$ where $a = x$

$b = -\frac{1}{x}$ $n = 11$ (odd)

Two middle terms

$\frac{n+1}{2}$ & $\frac{n+3}{2}$ $n = 11$

$\frac{}{6}$ & $\frac{}{7}$

Marks

$$\because T_{r+1} = {}^{n}c_r \; a^{n-r} b^r$$

$n = 6$

$$T_{5+1} = {}^{11}c_5 \; x^{11-5} \left(\frac{-1}{x}\right)^5$$

2

$$\boxed{T_6 = -462 \, x}$$

$n = 7$

$$T_{6+1} = {}^{11}c_6 \; (x)^{11-6} \left(\frac{-1}{x}\right)^6$$

$$\boxed{T_7 = \frac{462}{x}}$$

Q:5 (iii) Binomial expansion.

$$(x+2y)^5$$

1

$$\therefore (a+b)^n = a^n + n_{c_1} a^{n-1}b + n_{c_2} a^{n-2} b^2$$

$$+ \cdots \cdots + b^n$$

where $a = x$ $b = 2y$ $n = 5$

$$(x+2y)^5 = x^5 + 5c_1 x^4 (2y) + 5c_2 x^3 (2y)^2 \quad 2$$

$$+ 5c_3 x^2 (2y)^3 + 5c_4 x (2y)^4 + 5c_5 (2y)^5$$

Marks

$$(x+2a)^5 = x^5 + 10ax^4 + 40a^2x^3$$

$$+ 80a^3x^2 + 80ax^4 + 32a^5$$

2

——————— x ———————

Q:6 (i)

The Sequence

$$25, 30, 35 \quad ------ \quad Ap$$

$$a = 25 \quad d = 5$$ · · 1

General term of Ap.

$$T_n = a + (n-1)d$$ i

$$n = 21$$

$$T_{21} = a + (21-1)d$$

$$T_{21} = a + 20d$$ 2

put $a = 25 \quad d = 5$

$$T_{21} = 25 + 20 \times 5$$

$$\boxed{T_{21} = 125}$$

Marks

Q: 6 (ii)

given 3rd and 6th term
of G.p are

General term.= $\left[\because \ T_n = ar^{n-1} \right]$ 1.

$T_3 = ar^2 = 24 \qquad —①$

$T_6 = ar^5 = 192 \qquad —②$ .3

On dividing ② / ①

$$\frac{ar^5}{ar^2} = \frac{192}{24}$$

$r^3 = 8$	$a \cdot 4 = 24$
$r^3 = 2^3$	$\boxed{a = 6}$
$\boxed{r = 2}$	

10th Term

$T_{10} = ar^9$

$a = 6 \cdot 2^9$

$\boxed{\therefore T_{10} = 3072}$

3

Q. 6 (iii)

The sum of G.P

$$1 - \frac{1}{2} + \frac{1}{4} \cdots$$

1

$$a = 1, \quad r = -\frac{1}{2} < 1$$

$r < 1$

1

$$S_n = \frac{a(1 - r^n)}{1 - r}$$

$$S_n = \frac{1\left(1 - (-1/2)^n\right)}{1 + 1/2}$$

2

$$S_n = \frac{2}{3}\left[1 - \frac{(-1)^n}{2^n}\right]$$

1

$$\boxed{S_n = \frac{2^{1-n}}{3}\left[2^n - (-1)^n\right]}$$