



Sardar Patel University, Vallabh Vidyanagar

External Examination, BCA (OLD Batch)

Subject Code: US01FBCA02

Subject Title: MATHEMATICS-I

Date: 23-09-2022

Time: 09:30am to 11:30am

Marks: 70

**Q.1 MCQ**

[10]

- 1 Let  $A = \{1, 2, 3, 4\}$  and  $B = \{2, 4, 6, 8\}$  then  $A \cup B = \dots\dots\dots$ 
  - (a)  $A \cup B = \{1, 2, 3, 4, 6, 8\}$
  - (b)  $A \cup B = \{2, 4, 6, 8\}$
  - (c)  $A \cup B = \{2, 4, 6\}$
  - (d)  $A \cup B = \{2, 3, 4, 5, 6\}$
- 2 If  $U = \{1, 2, 3, \dots\dots\dots, 9\}$  and  $A = \{1, 2, 3, 4\}$   
Then  $A^c = \dots\dots\dots$ 
  - (a)  $\{1, 2, 3, 4\}$
  - (b)  $\{5, 6, 7, 8, 9\}$
  - (c)  $\{3, 4, 5, 6\}$
  - (d)  $\{1, 3, 5, 9\}$
- 3  $A \cap A = \dots\dots\dots$ 
  - (a)  $\Phi$
  - (b)  $A$
  - (c)  $U$
  - (d)  $B$
- 4 Let  $A = \{0, 1\}$ . Is  $A$  closed under multiplication?.....
  - (a) Yes
  - (b) No
- 5 Let  $D = \{2, 4, 6, \dots\dots\dots\} = \{n : n \text{ is even}\}$   
Is  $D$  closed under : (a) multiplication? (b) addition?  
 $D$  is closed under .....
  - (a) Multiplication
  - (b) Addition
  - (c) Both
  - (d) None
- 6  $(a^{-1})^{-1} = \dots\dots\dots$ 
  - (a)  $E$
  - (b)  $a$
  - (c)  $b$
  - (d) none
- 7 If  $u = (1, 2)$  and  $v = (3, 2)$  then  $u + v = \dots\dots\dots$ 
  - (a)  $(4, 3)$
  - (b)  $(4, 4)$
  - (c)  $(3, 4)$
  - (d)  $(1, 4)$
- 8 If  $u = (a, b)$  and  $v = (c, d)$  then  $u \bullet v = \dots\dots\dots$ 
  - (a)  $(ab + cd)$
  - (b)  $(ac + bd)$
  - (c)  $ac + bd$
  - (d)  $ad + bc$
- 9 The arithmetic mean for simple frequency distribution is given by .....
  - (a)  $\frac{\sum Xi}{n}$
  - (b)  $\frac{\sum fix_i}{n}$
  - (c)  $\frac{\sum fix_i}{N}$
  - (d) none
- 10 The median for grouped frequency distribution is given by .....
  - (a)  $l + \frac{h}{f} \left( \frac{N}{2} - c.f \right)$
  - (b)  $l + \frac{h}{f} \left( \frac{n}{4} - c.f \right)$
  - (c)  $l + \frac{h}{f} \left( \frac{n}{4} - f \right)$
  - (d) none

**Q.2 True/ False or Fill in the Blanks or One Word Answer.**

[08]

- 1 Let  $A = \{0, 1\}$ . It is a closed under multiplication. State True or False
- 2  $a^{-1} a = e$  State True or False
- 3 If  $u = (1, 2)$  and  $v = (3, 2)$  then  $u - v = (-2, -2)$  State True or False.
- 4 The length of vector  $w$  is denoted by  $\|w\|$ . State True or False.
- 5 The harmonic mean is given by \_\_\_\_\_
- 6 The observation whose frequency is highest is called \_\_\_\_\_
- 7 The norm of a vector  $d$  is denoted by \_\_\_\_\_
- 8 If  $u = (1, 2)$  and  $v = (2, 2)$  then  $u + v = \dots\dots\dots$

**Q.3 Short Questions (Attempt Any 10 out of 12)**

[20]

- 1  $X = \{ \text{red, blue} \}, Y = \{ \text{blue, green, orange} \}, Z = \{ \text{red, blue, white} \}$   
 $U = \{ \text{red, yellow, blue, green, orange, purple, black, white} \}$   
 Find (1)  $x^c \cap (y-z)$  (2)  $(x \cup y)^c$
- 2 Determine the power set of  $A = \{ a, b, c, d \}$
- 3 Define the terms with examples  
 (1) Complement of a set (2) Factorial function
- 4 Define  $*$  on  $Q$  by  $a * b = a + b - ab$ . Is it associative? Justify Your answer.
- 5 Define Duality. Find duality of  $(X \cup Y)^c = X^c \cap Y^c$
- 6 Define ideal in a ring. Let  $R$  be a ring and  $I$  be an ideal in  $R$ . If  $a \in I$
- 7 Consider  $u = (1, -2, 3, 4), v = (-2, 4, 5, -3), w = (5, -5, -3, 4)$  and  
 $z = (2, 7, 4, -2)$ . Find  $2u - 4w + 3v - 2z$
- 8 Find  $x$  and  $y$  if  $(x, 7) = (4, x + y)$
- 9 Find the length of the  $u = (3, -12, -4)$
- 10 The intelligence quotients (IQ's) of 10 boys is given below:  
 70, 120, 110, 101, 88, 83, 95, 98, 107, 100 Find the Mean IQ
- 11 The following is the frequency distribution of the number of telephone calls received in 245 successive one-minute intervals at an exchange.

No. of Calls	Frequency
0	14
1	21
2	25
3	43
4	51
5	40
6	39
7	12

Obtain the mean number of calls per minute

- 12 Prepare an inclusive frequency distribution consisting of six classes by classifying raw data of heights (in cms) of 30 students.  
 165 153 158 149 152 145 162 151 155 148  
 141 149 157 148 168 162 141 145 152 150  
 149 154 160 162 153 161 150 159 148 163

**Q.4 Long Questions (Attempt Any four from eight)**

[32]

- 1 By using Mathematical induction Method  
 Prove that  $1 + 3 + 5 + \dots + (2n - 1) = n^2$
- 2 Find the power set of  $A = \{ \{ a, b \}, \{ c \}, \{ d, e, f \} \}$
- 3 Consider the set of rational defined by  $a * b = a + b - ab$   
 Find  $(7 * 1/2)$  Is  $(Q, +)$  semigroup? Is it commutative?
- 4 If  $f(x) = 2x + 5, g(x) = x - 3$ , then find  $f \circ g(3)$  and  $g \circ f(-4)$

- 5 Find the inverse of  $A = \begin{pmatrix} 1 & 0 & 2 \\ 2 & -1 & 3 \\ 4 & 1 & 8 \end{pmatrix}$

6 Find  $x$ ,  $y$ ,  $z$  and  $t$ , if  $3 \begin{pmatrix} x & y \\ z & t \end{pmatrix} = \begin{pmatrix} x & 6 \\ -1 & 2t \end{pmatrix} + \begin{pmatrix} 4 & x+y \\ z+t & 3 \end{pmatrix}$

- 7 Calculate the mean, median, mode, harmonic mean and geometric mean for the following data.

<b>xi</b>	<b>fi</b>
10	14
30	23
50	27
70	21
90	15

- 8 Three groups of observations contain 8, 7, and 5 observations. Their geometric means are 8.52, 10.12, and 7.75 respectively. Find the geometric mean of the 20 observations in the single group formed by pooling the three groups.

—————x—————

