

Vidya Vikas Mandal's
Shree Damodar College of Commerce and Economics, Margao-Goa
SY B.Voc.(ST), Semester-III, Supplementary Examination August 2022
STG 303 – Reasoning Techniques

Max Marks: 80

Duration: 2hrs

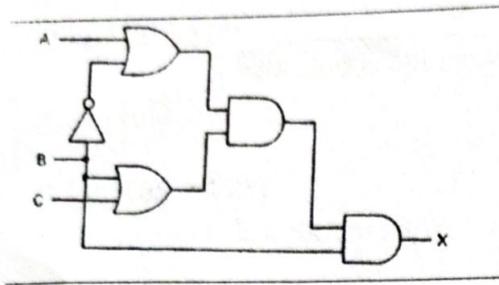
Instructions: i. All questions are compulsory however internal choice is provided
ii. Figures to the right indicate full marks

[5x4 = 20Marks]

Q I. Attempt the following:

- a) What do you mean by statements in logic? State whether the following are logical statements or not. If not, justify
- i. $2+3=6$
 - ii. What a beautiful place!
 - iii. He is a very good table tennis player
- b) i. Six friends A, B, C, D, E and F are sitting along the sides of a hexagonal table for playing a game, though not necessarily in same order.
- ii. F, who is sitting exactly opposite to A is to the immediate right of B.
 - iii. D is between A and B and is exactly opposite to c.
- A. who is sitting next to A?
B. who is sitting opposite B?
C. three of the following are alike in a certain way on the basis of sitting position and so form a group. Which is one that does not belong to the group?
- i. B,C ii. A,D iii. B,F iv. E,A
- c) In each of the following questions find out the alternative which will replace the question mark. Justify
- i. BEGK : ADFJ :: PSVY : ?
 - ii. AZBY : CXDW :: EVFU : ?
- d) Show that $(p \rightarrow q)$ is equivalent to $(\sim p \vee q)$

e) Find the output of the following if $A=1$, $B=0$ and $C=0$



OR

Q I. Attempt the following:

[5x4 = 20Marks]

p) State whether the following are inductive or deductive arguments

- i. All dogs have fleas
Benno is a dog
Benno has fleas
- ii. The teacher used PowerPoint in last few classes
therefore the teacher will use power point tomorrow.
- iii. Every fall there have been Hurricanes in the tropics.
therefore there will be Hurricanes in the tropic this coming fall
- iv. All men are mortal.
James was a man
James is mortal

q) Refer to the following information and answer the questions given below.

A. 7 students A,B,C,D,E,F and G take a series of tests.

B. No two students gets similar marks

C. G always scores more than A

D. A always scores more than B

E. Each time either C scores the highest and E gets the least or D scores the highest and F or B scores the least

i. If G is ranked 5th, which of these must be true?

a. D scores the highest

- b. C is ranked second
 - c. E is ranked third
 - d. B is ranked fourth
- ii. If D is ranked second, which of the following is true?
- a. A gets more than C
 - b. G gets more than D
 - c. A gets more than G
 - d. F gets more than G
- iii. If D is ranked 6th and B is ranked 5th, which of these can be true?
- a. G is ranked first or fourth
 - b. C is ranked second or third
 - c. A is ranked second or fifth
 - d. F is ranked third or fourth
- r) i. $14 : 9 :: 26 : ?$
 iii. $8 : 28 :: 27 : ?$
- s) If the statements p, q, r and s are assigned truth values T, F,F,T respectively. Find the truth values of the compound statements:
- i. $(p \wedge q) \rightarrow (\sim q \vee r)$
 - ii. $(p \wedge s) \leftrightarrow (\sim q \wedge \sim r)$
- t) Draw the NoT, NAND, NOR, and OR gate. If (x,y) are input values; write the output function of each of the mentioned gates.

Q II. Attempt the following:

[5x4 = 20Marks]

- a) Write the converse, inverse and contrapositive of the statement
 if you study well then you will pass the examination
- b) In each question given below followed by two assumptions numbered I and II. you have to consider the statement and the following assumptions and decide which assumption/s is implicit in the statement.
- i. 'See it first only on our channel', an advertisement of a news channel.
 Assumptions:
 I. Advertisement is the first and most important thing for every channel.
 II. other new channels do not want to show things first
 - ii. 'The present condition of law and order is worst of all time.'
 Assumptions:
 I. The present condition does not pay heed to the requirement of maintaining law and order.
 II. In earlier days, the law-and-order condition was better.
- c) Look carefully for the pattern, and then state which pair of numbers comes next
- i. 42 40 38 35 33 31 28
 - ii. 6 10 14 18 22 26 30
 - iii. 36 31 29 24 22 17 15

iv. 14 14 26 26 38 38 50
d) Dev, Kumar, Nilesh, Ankur and Pintu are standing facing to the North in a playground such as given below:

1. Kumar is at 40 m to the right of Ankur.
 2. Dev is 60 m in the south of Kumar.
 3. Nilesh is at a distance of 25 m in the west of Ankur.
 4. Pintu is at a distance of 90 m in the North of Dev.
- A. Which one is in the North-East of the person who is to the left of Kumar?
B. If a boy starting from Nilesh, met to Ankur and then to Kumar and after this he to Dev and then to Pintu and whole the time he walked in a straight line, then how much total distance did he cover?

e) Check whether $(p \rightarrow q) \rightarrow (\sim q \rightarrow \sim p)$ is a tautology

OR

Q II. Attempt the following:

[5x4 = 20Marks]

p) Prove by Principle of Mathematical Induction

$$P(n): 4+8+12+\dots+4n=2n(n+1)$$

q) In each of the question below a statement is followed by two courses of action namely 1 and 2. Based on the information given to you in the question assume everything to be true. Given below are the options. Choose from them the correct answer.

- A. If only 1 follows
- B. If only 2 follows
- C. If neither 1 nor 2 follows
- D. If both 1 and 2 follows

i. Statement: A very large number of students have failed in the final high school examination due to faulty questions in one of the subjects.

Courses of Action:

- I. All the students who have failed in the subject should be allowed to take supplementary examination.
- II. All those who are responsible for the error should be suspended and an enquiry should be initiated to find out the facts.

ii. Statement: Doordarshan is concerned about the quality of its programmes particularly in view of stiff competition it is facing from STAR and other satellite TV channels and is contemplating various measures to attract talent for its programmes.

Courses of Action:

- I. In an effort to attract talent, the Doordarshan has decided to revise its fee structure for the artists.
 - II. The fee structure should not be revised until other electronic media also revise it.
- r) Find the number that fits somewhere into the middle of the series
- i. J14, L16, __, P20, R22, ...
 - ii. 4, 7, 25, 10, __, 20, 16, 19,
 - iii. U32, V29, __, X23, Y20, ...
 - iv. $(1/9)$, $(1/3)$, 1, ____, 9, ...
- s) A+B means A is the daughter of B
A-B means A is husband of B
AxB means A is brother of B
- i. What will be relationship between M and O if M+N-O?
 - ii. What will be relationship between M and O if MxN+O?
 - iii. What will be relationship between M and O if M+nxO
- t) $a \in Z$. If a^2 is even, then a is even.

Q III. Attempt the following:

[5x4 = 20Marks]

a)

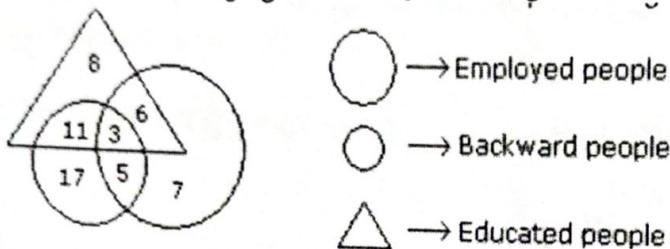
The results of half yearly and annual examinations are shown in the table given below.

Result	No. of Students			
	Section A	Section B	Section C	Section D
Students failed in both Exams	28	23	17	27
Students failed in half-yearly but passed in Annual Exams	14	12	8	13
Students passed in half-yearly but failed in Annual Exams	6	17	9	15
Students passed in both Exams	64	55	46	76

- i. How many students are there in Class IX in the school?
 - ii. Which section has the maximum pass percentage in at least one of the two examinations?
- b) Answer the following questions:
- i. How many hours are there in a year?

- ii. In between 11 and 1 O'clock, how many times both the hands will coincide with each other?
- iii. If the two hands are in opposite direction then what is the difference of degree and min between the two hands?
- iv. In 12 hrs, how many times both hands in opposite direction can be observed?

c) Study the figure and answer the questions given below:



- i. How many educated people are employed?
 - ii. How many backward people are educated?
 - iii. How many backward uneducated people are employed?
 - iv. How many backward people are not educated?
- d) Write down the truth table for if then and if and only if
- e) In each of the following problems, there is one question and three statements I, II and III given below the question. You have to decide whether the data given in the statements is sufficient to answer the question. Read all the statements carefully and find which of the statements is/are sufficient to answer the given question.
- i. What is Suman's rank from the top in a class of forty students ?
 - I. Suman is 3 ranks below Deepak from the top.
 - II. Deepak's rank from the bottom is 23.
 - III. Suman is 3 ranks above Deepak from the bottom
 - A. Any two of the three
 - B. Only I and II
 - C. Only II and III
 - D. All I, II and III
 - E. Only II and either I or III
 - ii. How is 'DATE' written in the code language ?
 - I. DEAR is written as \$#@? in that code.
 - II. TREAT is written as %?#@% in that code.

III. TEAR is written as %#@? in that code

- A. Only I and II
- B. Only II and III
- C. All I, II and III
- D. Only I and either II or III
- E. None of these

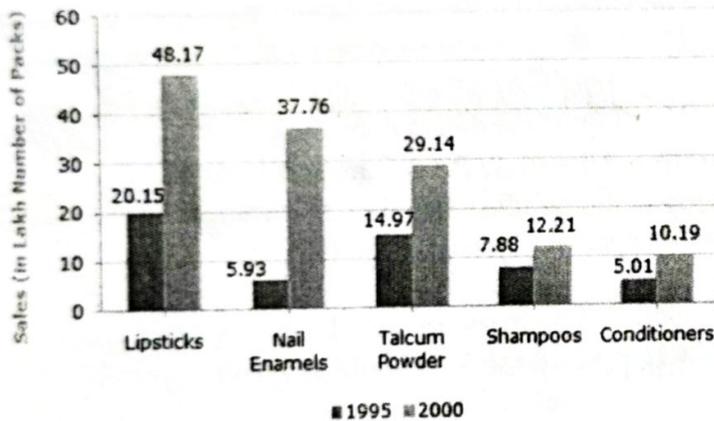
OR

Q III. Attempt the following:

[5x4 = 20Marks]

p) A cosmetic company provides five different products. The sales of these five products (in lakh number of packs) during 1995 and 2000 are shown in the following bar graph.

Sales (in lakh number of packs) of five different products of Cosmetic Company during 1995 and 2000

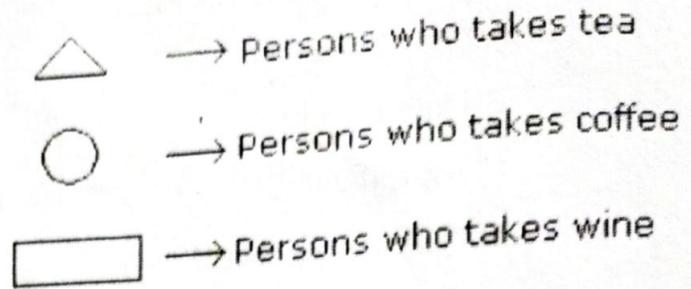
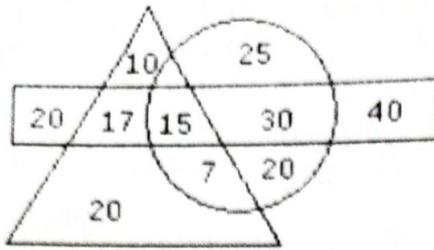


- i. The sales of lipsticks in 2000 was by what percent more than the sales of nail enamels in 2000? (rounded off to nearest integer)
- ii. During the period 1995-2000, the minimum rate of increase in sales is in the case of?

q) Study the information to answer the given questions in a certain code "the best way to win" is written as 'ad mi ja no', 'the way to hell' is written as 'ku ja ig ad'. 'win of the day' is written as 'be ku zo mi' and 'to sell of night' is written as 'be li ya ja'.

- i. What is the code for 'hell is way'?
- ii. 'mi' is the code for?
- iii. What is the code for 'best'?
- iv. Which of the following represents 'of the way'?

r) Study the diagram given below and answer each of the following questions.



- How many persons who take tea and wine but not coffee ?
- How many persons are there who take both tea and coffee but not wine ?
- How many persons are there who takes only coffee ?
- How many persons takes all the three ?

s) construct the truth table for the following compound statements

- $(p \wedge q) \rightarrow (\sim p \vee q)$
- $\sim(p \wedge q) \leftrightarrow (p \vee \sim q)$

t) In each of the questions below consists of a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements

i. How is 'No' coded in the code language ?

I. Ne Pa Sic Lo' means 'But No None And' and 'Pa Lo Le Ne' means 'If None And But'.

II. 'Le Se Ne Sic' means 'If No None Will' and 'Le Pi Se Be' means 'Not None If All'.

ii. Who among P, Q, T, V and M is exactly in the middle when they are arranged in ascending order of their heights ?

I. is taller than Q but shorter than M.

II. T is taller than Q and M but shorter than P.

Q IV. Attempt the following:

[5x4 = 20Marks]

a) Each question presents a situation and asks you to make a judgment regarding that particular circumstance. Choose an answer based on given information.

I. The neighborhood block association has received many complaints about people knocking on doors and soliciting money for an unknown charity organization even though door-to-door solicitation is prohibited by local laws. Three residents have provided descriptions of individuals who have come to their door asking for money.

Solicitor #1 is a white male, 20-25 years old, 5'9", 145 pounds, with very short brown hair. He was wearing a dark blue suit and carrying a brown leather briefcase.

Solicitor #2 is a white male, 25-30 years old, 6'2", 200 pounds, with a shaved-head. He was wearing a red T-shirt and jeans.

Solicitor #3 is a white male, approximately 23 years old, 5'10", slight build, with short brown hair. He was wearing a blue suit.

Three days after the block association meeting, a resident noticed a man knocking on doors in the neighborhood and phoned the police to report the illegal activity. This solicitor was described as follows:

Solicitor #4 is a white male, 22 years old, 140 pounds, about 5'10", with short brown hair. He was carrying a briefcase and wearing a dark suit.

Based on this description, which of the three solicitations was also likely carried out by Solicitor #4?

- A. #1, #2, and #3
- B. #1, but not #2 and #3
- C. #1 and #3, but not #2
- D. #1 and #2, but not #3

II. Mark is working with a realtor to find a location for the toy store he plans to open in his town. He is looking for a place that is either in, or not too far from, the center of town and one that would attract the right kind of foot traffic. Which of the following locations should Mark's realtor call to his attention?

- A. a storefront in a new high-rise building near the train station in the center of town whose occupants are mainly young, childless professionals who use the train to commute to their offices each day.
- B. a little shop three blocks away from the town's main street, located across the street from an elementary school and next door to an ice cream store
- C. a stand-alone storefront on a quiet residential street ten blocks away from the town's center
- D. a storefront in a small strip mall located on the outskirts of town that is also occupied by a pharmacy and a dry cleaner

b) Minimize $z = A'B' + B'C'$ using Karnaugh maps

- c) i. What was the day of the week on 28th May, 2006?
- ii. Today is Monday. After 61 days, it will be?

d) State which of the conclusions are implicit.

- i. **Statements:** Only good singers are invited in the conference. No one without sweet voice is a good singer.

Conclusions:

- I. All invited singers in the conference have sweet voice.
- II. Those singers who do not have sweet voice are not invited in the conference.

- ii. **Statements:** Applications of applicants who do not fulfil eligibility criteria and/or who do not submit applications before last date will be summarily rejected and will not be called for the written test.

Conclusions:

- I. Those who are called for the written test are those who fulfil eligibility criteria and have submitted their applications before last date.

II. Written test will be held only after scrutiny of applications.

e) Write the following compound statements in sentences

- i. Geeta is practical but not lazy
- ii. Either it is very hot or the fan is not working
- iii. Mathematics is easy if and only if he is intelligent

OR

Q IV. Attempt the following:

[5x4 = 20Marks]

p) Read the paragraph carefully and determine the main point the author is trying to make. What conclusion can be drawn from the argument? Each paragraph is followed by five statements. One statement supports the author's argument better than the others do.

i. One New York publisher has estimated that 50,000 to 60,000 people in the United States want an anthology that includes the complete works of William Shakespeare. And what accounts for this renewed interest in Shakespeare? As scholars point out, his psychological insights into both male and female characters are amazing even today.

This paragraph best supports the statement that

- A. Shakespeare's characters are more interesting than fictional characters today.
- B. people even today are interested in Shakespeare's work because of the characters.
- C. academic scholars are putting together an anthology of Shakespeare's work.
- D. New Yorkers have a renewed interest in the work of Shakespeare.
- E. Shakespeare was a psychiatrist as well as a playwright.

ii. Generation Xers are those people born roughly between 1965 and 1981. As employees, Generation Xers tend to be more challenged when they can carry out tasks independently. This makes Generation Xers the most entrepreneurial generation in history.

This paragraph best supports the statement that Generation Xers

- A. work harder than people from other generations.
- B. have a tendency to be self-directed workers
- C. have an interest in making history
- D. tend to work in jobs that require risk-taking behavior.

E. like to challenge their bosses work attitudes.

q) Prove that i. $(a+b) \cdot (b'+c) + b \cdot (a'+c') = a \cdot b' + a \cdot c + b$

ii. $x \cup x = X, x \in A$

r) Eight female members of the family decides to have a family photo and are sitting on a bench to be photographed. Read the following instructions to perform the seating arrangement to answers the questions.

1. Mrs. Divya is to the right of Mrs. Anne.
2. Akshata is the middle if Myra and Mrs. Banumathi.
3. Mrs. Veena is standing at one of the ends and is second to the right of Mrs. Divya.
4. Myra always wants to stand next to her mother Mrs. Anne and is third to the left of Mrs. Sandhya.
5. Who is standing at the left extreme end in the photograph?
6. Mrs. Veena
7. Mrs. Usha
8. Mrs. Banumathi
9. Akshata
 - i. Who is third from the left in the photograph?
 - ii. Which two females are at the ends?
 - iii. Which two ladies are in the middle?
 - iv. Who is to the right of Akshata?

s) which of the following course/s of action follow?

i. **Statement:** A large number of students are reported to be dropping out of school in villages as their parents want their children to help them in farms.

Courses of Action:

- I. The government should immediately launch a programme to create awareness among the farmers about the value of education.
- II. The government should offer incentives to those farmers whose children remain in schools.
- III. Education should be made compulsory for all children up to the age of 14 and their employment banned.

ii. **Statement:** Without the active cooperation between the proprietor and the employees of the mill, it cannot remain a profitable concern for long.

Courses of Action:

- I. The mill should be closed down.
- II. The workers should be asked to cooperate with the owners.
- III. The owners should be asked to cooperate with the employees.

t). check the validity of the following argument.

If I say 'hmmm' a lot , then people will think I am smart

I say 'hmm' a lot

Therefore people think I am smart
