Duration: 2 Hours   Max Marks: 80

Instructions: 1)Start each question on fresh page
2) Figures to the right indicate Full Marks.
3) All Questions are compulsory.
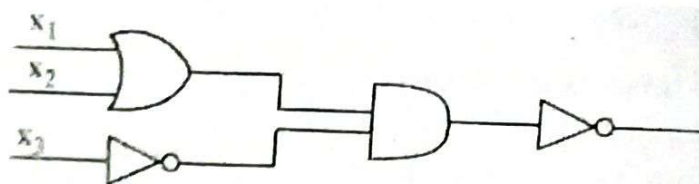
Q.1.Answer ANY FOUR of the following .   (4x4= 16 marks)

a) Check if the following are statements or not. Justify your answer.
   i)Welcome to the university of Amsterdam.
   ii)She is a badminton player.

b) Consider the given statement and the following assumption and
   decide whether the assumption is implicit in the statement. Justify your answer.
   Statement: Of all the TV sets manufactured in India ,brand X has the highest sale.
   Assumption: The sale of all TV sets manufactured in India is known.

c) Draw the possible logical venn diagrams for the following.
   Statement:Only first divisioners are admitted..
          Ram is a first divisioner.

d) Take the given two statements to be true and decide which of
   the given conclusions logically follows and which doesen't.
   justify your answer.
   Statement 1: Some crows are jackals.
   Statement 2: No fox is a crow.
   Conclusion 1: Some jackals are foxes.
   Conclusion 2: Some jackals are not foxes.

e) If the day today is Monday, then find what is the day
   i) on 63rd day   ii) 64th day
   Justify your answer.

f) If in the examination hall, you find that the question paper is too tough to be answered
   satisfactorily by you, the best thing to do for you is to :
          A) tell the examiner that the questions are out of course.
          B) provoke the candidates to walk out of the examination hall.
          C) try to know something from your neighbour.
          D) try to solve the questions as much as you know with a cool head.
   Justify your answer.

Q.2.Answer ANY FOUR of the following .   (4x4 = 16 marks)

a) Reptile is to lizard as flower is to
   i) petal   ii) stem   iii) daisy   iv)alligator   Justify your answer.

b) Let p and q be the propositions
   p : It is below freezing
   q : It is snowing
   write the following propositions using p and q and logical connectives.
   i)It is below freezing and snowing.
   ii)it is either below freezing or snowing ,but it is not snowing if it is
      below freezing.

c) Seema is looking for a radio jockey to work on her radio show called
   Seema Rockerz. The show is focused on the issues and troubles faced by
   the elderly. She is looking for a passionate and dedicated candidate.
   The applications that she receives are all very good. The show is live and
   will be aired every night at around 11 pm to 12 pm. Which of the following
   candidates are suitable for the job of the radio jockey? Justify your answer.
   A) Ravi – Ravi is a 17-year-old who has recently finished his studies and will
      be taking a one year break from studies. He loves to work as a radio jockey and is
      available to work throughout the night.
   B) Mukesh – Mukesh is a college student who can work night shifts. During
      his spare time, Mukesh works at the Old age home near his college to support
      his education.
   C) Ali – Ali is a 34-year-old doctor who has dedicated his career to the service
      of the elderly. Ali works at the bone and joint hospital for the elderly and will be
      available for two hours each night.
      Justify your answer.

d) Write the negation of i) Today is Thursday.
   Write the contrapositive of i) "If today is Sunday, then it is a holiday."

e) Draw the K-map for the sum of products expansion
   $$x\,y\,\bar{z} + x\,\bar{y}\,\bar{z} + \bar{x}\,\bar{y}\,z + \bar{x}\,\bar{y}\,\bar{z}$$
   And hence use it to minimize this sum of products expansion.

f) Find $f(x_1, x_2, x_3)$ in the given circuit.

Also find the output of $f(x_1, x_2, x_3)$ if the input values are as follows:

$$x_1 = 0 \quad , \quad x_2 = 1 \quad , \quad x_3 = 1$$

Q.3. Answer the following questions.

A. In the following questions, the symbols @, CC, $, %, and # are used to illustrate the following meanings:

P $ Q means that 'P is not smaller than Q'

P # Q means 'P is not greater than Q'

P @ Q means that 'P is neither smaller than nor equal to Q'

P CC Q means that 'P is neither greater than nor equal to Q'

P % Q means 'P is neither greater than nor smaller than Q'

Now in each of the following questions, assuming the given statements to be true, find which of the conclusions, I, II given below is/are definitely true. Justify your answer.

1. **Statement**: H % J, J CC N, N @ R

   Conclusion: 1. R % J 2. H @ J

A. Only I is true.	B. Only II is true
C. I and II are true	D. I and II are false

2. **Statements**: M @ j, J $ T, T CC N

   Conclusions: 1. N # J   2. T CC N

A. I and II are true	B. Only II is true
C. Only I is true	D. All are false

   (6 marks)

OR

B. For the following statement find which of the conclusion follows.
Give justification for each conclusion stating why it follows
or doesen't follow.

Statement: Players who break various records in a fair way get special prizes.
Player X broke the world record but was found to be under the influence
of a prohibited drug.

Conclusion I: X will get special prize.

Conclusion II: X will not get special prize.

Conclusion III: X is not a fair player.

(6 marks)

C. Six persons A,B,C,D,E ,F are sitting in two rows.Three in each.

E is not at the end of any row.

D is second to the left of F.

C, the neighbour of E, is sitting diagonally opposite to D.

B is the neighbour of F.

1. Who is facing B?

2. Who are sitting at the extremes?

3. Who is facing E?

4. Which three persons are sitting together? **(6 marks)**

Q.4. Answer the following questions.

A. All the 6 members of the family are travelling together. B is the son of C but Not the mother of B. A and C are a married couple. E is the brother of C. D is the daughter of A. F is the brother of B.
   1. How many male members are there in the family?
   2. Who is the mother of B?
   3. How many children does A have?
   4. How is D related to F?
   5. Who are the female family members?
   6. How is E related to D?

(6 marks)

OR

B. Read the following information and answer the question that follows. Justify your answer using a diagram
   i) One morning Udai and Vishal were talking to each other face to face at a crossing. If Vishal's shadow was exactly to the left of Udai, which direction was Udai facing?

   A.East   **B.**West   **C.**North   **D.**South

   ii) Starting from the point X, Jayant walked 15 m towards west. He turned left and walked 20 m. He then turned left and walked 15 m. After this he turned to his right and walked 12 m. How far and in which directions is now Jayant from X?

   A. 32m South   B. 47m East   C. 42m North   D. 27m South

(6 marks)

C. A, B, C, D, E, F, G, H are eight friends. 3 of them play cricket and table tennis each and two of them play football. Each of them have different height.
   The tallest doesn't play football and the shortest does not play cricket.
   F is taller than A and D but shorter than H and B.
   E who does not play cricket, is taller than B and is second to the tallest.
   G is shorter than D but taller than A.
   H, who is fourth from the top, plays table tennis with D.
   G doesn't play either cricket or football. B doesn't play football.
   i) Who is the tallest?
      a) B   b) H   c) C   d) Data Inadequate
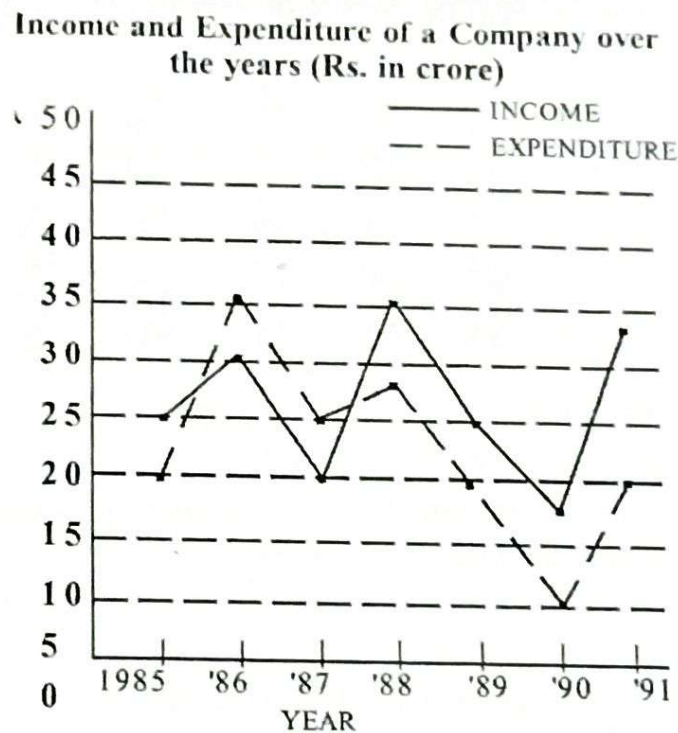   ii) Who is the shortest?
      a) G   b) D   c) A   d) Data Inadequate

iii)Which of the following pairs of friends plays football?
    a) EA   b)EH   c) HF   d) Data Inadequate

iv)What is F's position from the top when they are arranged in descending order of their height?
    a) 5th   b)4th   c) 6th   d) NONE   **(6 marks)**

Q.5.Answer the following questions.

A. Analyze the following graph carefully and answer the questions given below

Income and Expenditure of a Company over the years (Rs. in crore)
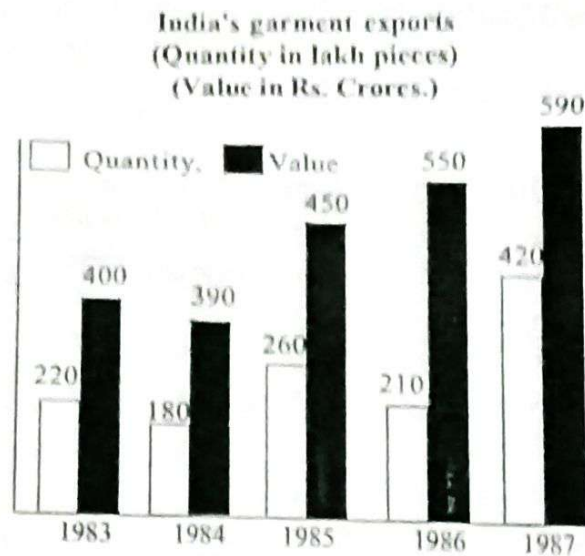

1. In which of the following years was the difference between the income and the expenditure the maximum?
    a) 19 88   b) 19 91   c) 19 86   d) 19 87

2. The income in 1987 was equal to the expenditure in which of the following years?
    a) 1985 only   b) 1990 only   c) 1985, 1989 and 1991   d) 1988 and 1989

3. What was the approximate percentage drop in expenditure from 1988 to 1989?
    a) 3 5   b) 2 5   c) 7 5   d) 4

4. What was the percentage increase in income from 1987 to 1988?
    a) 1 7 5   b) 7 5   c) 6 0   d) 1 2   **(6 marks)**

<div align="center">OR</div>

B. Analyze the following graph carefully and answer the questions given below

India's garment exports
(Quantity in lakh pieces)
(Value in Rs. Crores.)

1) What was the percent increase in export value from 1983 to 1986?
   a) 1 0 0   b) 25. 9   c) 37. 5   d) 1 3 5

2) What was the difference between the pieces of garments exported in 1984 and 1985?
   a) 80, 00,000 b) 8,00,000 c) 8,00,00,000 d) None

3) What was the approximate percentage drop in export quantity from 1983 to 1984?
   a) 2 2   b) 1 8   c) 4 0   d) 8

4) In which of the given years the value per piece was minimum?
   a) 19 87   b) 19 84   c) 19 85   d) 19 86

(6 marks)

C. Show that if n is a positive integer, then $1 + 2 + 3 + \ldots + n = \frac{n(n+1)}{2}$ (6 marks)

Q.6.Answer the following questions.

A. Find the missing number in the following number sequences.
   Justify your answer.
   i) 7, 10, 8, 11, 9, 12,   ?
   ii) 21, 9, 21, 11, 21, 13, 21,   ?
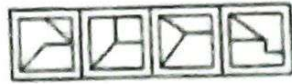   iii) 14, 28, 20, 40, 32, 64, ?

(6 marks)

OR

B. Find out which of the figures (1), (2), (3) and (4) can be formed from the pieces given in figure (X). Justify your answer by drawing a figure.
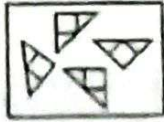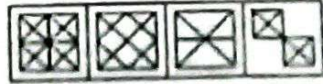
1.

2.

(6 marks)

C. a . Let P(x) be the statement " x+1>x ". What is the truth value of the statement ∀x
P(x) where the domain consists of all the real numbers?

b .Verify whether the following statement is a tautology.

(p ∧ q) ∧ ~ (p ∨ Q)

(6 marks)