

Roll No :

Total No. of Questions : 11]

[Total No. of Printed Pages : 4

MCL-770

M.Sc. Lateral Entry Examination, 2021

COMPUTER SCIENCE

Paper - MCSLE-101

(Mathematics for Computer Science)

Time : 1½ Hours]

[Maximum Marks : 50

Section-A

(Marks : 2 × 10 = 20)

Note :- Answer all *ten* questions (Answer limit 50 words). Each question carries 2 marks.

(खण्ड-अ)

(अंक : 2 × 10 = 20)

नोट :- सभी दस प्रश्नों के उत्तर दीजिए (उत्तर-सीमा 50 शब्द)। प्रत्येक प्रश्न 2 अंक का है।

Section-B

(Marks : 3 × 5 = 15)

Note :- Answer all *five* questions. Each question has internal choice (Answer limit 200 words). Each question carries 3 marks.

(खण्ड-ब)

(अंक : 3 × 5 = 15)

नोट :- सभी पाँच प्रश्नों के उत्तर दीजिए। प्रत्येक प्रश्न में विकल्प का चयन कीजिए (उत्तर-सीमा 200 शब्द)। प्रत्येक प्रश्न 3 अंक का है।

Section-C

(Marks : 5 × 3 = 15)

Note :- Answer any *three* questions out of five (Answer limit 500 words). Each question carries 5 marks.

(खण्ड-स)

(अंक : 5 × 3 = 15)

नोट :- पाँच में से किन्हीं तीन प्रश्नों के उत्तर दीजिए (उत्तर-सीमा 500 शब्द)। प्रत्येक प्रश्न 5 अंक का है।

BI-381

(1)

MCL-770 P.T.O.

Section–A

2 each

1. Attempt all *ten* questions.

(i) Explain product of set with example.

(ii) State Pigeonhole principle.

(iii) Find x if $y = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ and $2x + y = \begin{bmatrix} 1 & 0 \\ -3 & 2 \end{bmatrix}$.

(iv) Explain cross product of vector.

(v) Find the negation of $P \rightarrow Q$.

(vi) Prove the following by using Truth Table :

$$P \vee (Q \wedge R) \equiv (P \vee Q) \wedge (P \vee R)$$

(vii) Explain composition of Relations.

(viii) What do you mean by Digraph of Poset ?

(ix) Find the domains of the following functions :

$$f(x) = \frac{x}{x-5}$$

(x) Find the equation of the circle with centre $(-2, 3)$ and radius 4.**Section–B**

3 each

2. Draw the Venn diagram and indicate the region for the given set :

(i) $A - (B \cup C)$ (ii) $B^C - C$ **Or**

In the IEEE conference held at New York, 500 delegates attended. 200 of them could take tea, 350 could take coffee and 10 did not take either coffee or tea.

Then answer the following questions :

(i) How many can take both tea and coffee ?

(ii) How many can take tea only ?

3. If :

$$A = \begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$$

Verify that :

$$A \cdot (\text{adj } A) = (\text{adj } A) A = |A| I_3$$

Or

Using vectors, show that the points A(-2, 1); B(-5, -1) and C(1, 3) are collinear.

4. Prove by Mathematical Induction :

$$1^2 + 4^2 + 7^2 + \dots + (3n - 2)^2 = \frac{n(6n^2 - 3n - 1)}{2}$$

Or

Solve the following using Truth Table :

$$(P \rightarrow (Q \rightarrow R)) \leftrightarrow ((P \wedge Q) \rightarrow R)$$

5. Let N be the set of all natural numbers. R be a relation in N defined by xRy if and only if $x + 3y = 12$. Examine the relation for :

- (i) Reflexive
- (ii) Symmetric
- (iii) Transitive

Or

For the poset [X, / (divides)], where :

$$X = \{1, 3, 5, 7, 15, 21, 35, 105\}$$

determine the following :

- (i) lubs of $A_1 = \{3, 7\}$, $A_2 = \{3\}$
 - (ii) glb of $A_3 = \{15, 35\}$
 - (iii) greatest and least element of X
6. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = x^2 + x - 6$. Find :
- (i) $F^{-1}(14)$
 - (ii) $F^{-1}(-8)$

Or

Prove that the points (-2, 5), (0, 1) and (2, -3) are collinear.

Section-C

5 each

Note :- Answer any *three* questions out of five.

7. (a) For all sets A and B prove that :

$$(A \cap B) \cup (B - A) \equiv B$$

- (b) There are 3 toys to be distributed among 7 children. In how many ways can it be done such that :

- (i) No child gets more than one toy.
 (ii) There is no restriction as to the number of toys any child gets.

8. (a) Find the value of x such that :

$$[[x]] \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = 0$$

- (b) Show that the point A(2, -1, 1); B(1, -3, -5) and C(3, -4, -4) are the vertices of the right angled triangle.

9. (a) Prove the following :

$$P \rightarrow (Q \wedge R) \equiv (P \rightarrow Q) \wedge (P \rightarrow R)$$

(b)
$$\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \dots + \frac{1}{n \times (n+1)} = \frac{n}{n+1}$$

10. (a) Prove that if R be an equivalence relation defined in a set A, then R^{-1} is also an equivalence relation in the set A.

- (b) Let R_1 and R_2 be relation on the set S. Show that $(R_1 \cup R_2)$ is reflexive if both R_1 and R_2 are reflexive.

11. (a) Find the equation of the straight line which passes through (1, -2) and cut off equal intercepts on the axes.

- (b) If the equations of *two* diameters of a circle are $2x + y = 6$ and $3x + 2y = 4$ and the radius is 10. Find the equation of the circle.