TEST (I / II) / PRELIMINARY EXAMINATION

Name of Candidate :

(IN BLOCK LETTERS)   (Surname)   (First Name)   (Middle Name)

Year : FE / SE / TE / BE   Branch : _____   Division : _____   Roll No. :

Semester : I / II Name of Subject : _____

Total Supplements : 1 + _____ = _____

_____ Signature of Student _____   _____ Signature of Supervisor _____

Question Number	1	2	3	4	5	6	7	8	9	10	Total
Marks Obtained											
Marks out of											

Signature of Examiner :   Signature of Moderator :

(Start From here only)

Unit - 2

① $A = \{a, b\}$ & $B = \{4, 5, 6\}$.

List the elements in i) $A \times B$ ii) $(A \times B) \times A$

iii) $A \times (B \times A)$ iv) $B \times A$

② Let $A = \{1, 2, 3, 4\}$ & $B = \{1, 4, 6, 8, 9\}$

$R = \{(a, b) \mid b = a^2\}$

Find domain, range of R.

Find also its relation matrix & draw its diagraph

③ Let $A = \{1, 2, 3, 4, 5\}$ & $R = \{(1,1)(1,2)(1,3)(1,4)(1,5)$

$(2,1)(4,1)(4,5)(5,1)\}$

Draw the diagraph of R

• ④ $A = \{1, 2, 3, 4\}$

IF $R = \{(a, b) \mid (a-b)$ is an integral non-zero multiple of $2\}$

and

$S = \{(a, b) \mid (a-b)$ is an integral non-zero multiple of $3\}$

Find $R \cup S$ & $R \cap S$

• ⑤ Let $A = \{1, 2, 3, 4, 5\}$ Relations R_1 & R_2 given by

$R_1 = \{(1, 2)(3, 4)(2, 2)\}$ &

$R_2 = \{(4, 2)(2, 5)(3, 1)(1, 3)\}$

Find ① $R_1 \cdot R_2$ ② $R_2 \cdot R_1$ ③ $R_1 (R_2 R_1)$

④ R_1^3 ⑤ $R_2^{3^2}$

• ⑥ IF $A = A = B = \{1, 2, 3\}$ &

$R_1 = \{(1, 1)(1, 2)(2, 3)(3, 1)\}$

and

$R_2 = \{(2, 1)(3, 1)(3, 2)(3, 3)\}$

Compute

ⓐ Complement of R_1

ⓑ Converse of R_2

ⓔ $R_1 \circ R_2$ (composite Relation)

④ Let $A = \{1, 2, 3, 4\}$. Consider the following Relations on A.

$R_1 = \{(1, 3)(2, 3)(4, 1)\}$

$R_2 = \{(1, 1)(2, 1)\}$

$R_3 = \{(3, 4)\}$

$R_4 = \{(1, 1)(2, 2)(3, 3)\}$

$R_5 = \{(1, 3)(2, 4)\}$

Determine which Relations are

① Reflexive
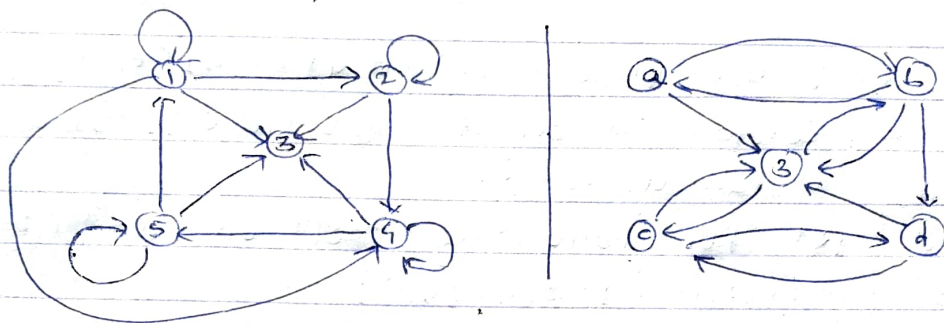
② Symmetric

③ transitive

④ Equivalence

⑤ partial ordering Relation

⑧ Determine whether Relation R whose matrix M_R is equivalence rel^n

$$M_{R_1} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix} \quad \& \quad M_{R_2} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

⑨ From diagram determine whether R is – reflexive, irreflexive, symmetric, Anti-Symmetric or transitive

⑩ Let R = be the rel^n on Set A

$A = \{2, 3, 4, 6, 8, 12, 38, 48\}$ defined by

$R = \{ (a, b) \mid a$ is divisor of $b\}$

Draw diagraph & Hasse diagram

⑪ Draw diagraph of rel^n R & determine whether R is Reflexive, Symmetric, transitive & anti-Symmetric

$A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ & $x R y$ where y is divisible by x.

⑫ Given $S = \{1, 2, 3, 4, 5\}$ & R and S cohere on

$R = \{ (x, y) \mid x + y = 5\}$

What are the properties of R?

⑬ Let $A = \{1, 2, 3, 4\}$ and $R = \{ (1,1) (1,2) (2,2) (2,4)$
$(1,3) (3,3) (3,4) (1,4) (4,4) \}$. Show that R is a partical order & draw its a Hasse diagram.

⑭ Draw the Hass diagram of following Sets under the partial ordering Relation "divides"
— i> $\{2, 4, 12, 24\}$
— ii> $\{1, 3, 5, 15, 30\}$
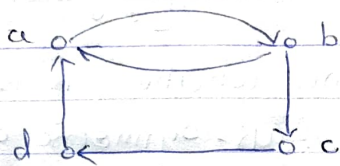
⑮ Let $A = \{1, 2, 3, 4\}$ and

$R = \{ (1,1)(1,2)(1,3)(2,1)(2,2)(3,1)(2,3)(3,2)(3,3)(4,4)\}$

Show that R is an equi. rel^n & determine the equi. classes and rank

⑯ If $A = \{1, 2, 3, 4, 5\}$ and $R = \{(1,2)(3,4)(4,5)(4,1)(1,1)\}$
find its transitive closure (i.e R^*)

(17) Let R be relation on Set $A = \{a, b, c, d\}$ with directed graph shown below. Find its transitive closure R^* using warshall algo.

(18) let $R = \{(b,c)\ (b,e)\ (c,e)\ (d,a)\ (c,b)\ (e,c)\}$ be a relation on Set $A = \{a, b, c, d, e\}$. Find R^* using warshall's algo.

(19) find R^* for following relⁿ on $A = \{1, 2, 3, 4\}$
- → $\{(1,2)\ (2,1)\ (2,3)\ (3,4)\ (4,1)\}$
- ii) $\{(2,1)\ (2,3)\ (3,1)\ (3,4)\ (4,1)\ (4,3)\}$

(20) find R^* for relation on $A = \{a, b, c, d, e\}$
- i) $\{(a,c)\ (b,d)\ (c,a)\ (d,b)\ (e,d)\}$
- ii) $\{(a,d)\ (d,c)\ (c,d)\ (c,a)\ (b,c)\ (b,a)\}$

(21) If $F(x) = -3x + 2$ & $g(x) = |x - 4|$ find $f \circ g (-2)$

(22) $f(x) = x^2 + 2$ & $g(x) = \sqrt{x - 2}$ find $f \circ g(x)$

(23) $f(x) = x + 1$ & $g(x) = 3x$ find $f \circ g(x)$

(24) $f(x) = x^2 + 1$ & $g(x) = \sqrt{2x}$ find $f \circ g(x)$

(25) $F = \{(a,b)\ (b,a)\ (c,b)\}$ is function from x to x & $x = \{a, b, c\}$. Find $f \circ f$

(26) $f(x) = x^2$ & $g(x) = 2^x$ find $f \circ f$, $g \circ g$, $f \circ g$, $g \circ f$

Unit - III

HOMO (1) $a_r - 7a_{r-1} + 10a_{r-2} = 0$ $\qquad a_0 = 0$ & $a_1 = 3$

HOMO (2) $a_r - 4a_{r-1} + 4a_{r-2} = 0$ $\qquad a_0 = 1$ & $a_1 = 6$

Total (1) $a_r - 7a_{r-1} + 10a_{r-2} = 3^r$ $\qquad a_0 = 0$ & $a_1 = 1$

T+N solⁿ (2) $a_r + 6a_{r-1} + 9a_{r-2} = 3$ $\qquad a_0 = 0$ & $a_1 = 1$

(3) $a_r + a_{r-1} + a_{r-2} = 0$ $\qquad a_0 = 6$ & $a_1 = 2$