R17 Regulation *Subject code:1P3EC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech II Year I Semester Supplementary Examinations, March/April 2023

Mathematical Foundations of Computer Science

(Common to CSE & IT)

Maximum Marks: 70 Date:01.04.2023 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 Construct the truth table of $(PVQ) \rightarrow P$

2 Write the rule of disjunctive amplification of predicates

3 Let R= { [1,1] [2,2] [3,3] [4,4] [5,5] [1,2] [2,1] [5,4] [4,5]} be the equivalence relation on A = {1,2,3,4,5} Find equivalence classes and A/R

4 Define Lattice.

5 In how many ways can the digits 0,1,2,3,4,5,6,7,8,9 be arranged so that
i) 0and 1 are adjacent and in the order 01 ii) 0,1 are adjacent.

6 Find the number of integral solutions to $x_1+x_2+x_3+x_4 =50$ where x, ≥ 2, $x_2 \geq 3$, $x_3 \geq 10$, $x_4 \geq 4$

7 Show that binary operation * defind on (R,*) where $x*y=x^y$ is not associative.

8 Define permutation group and degree of a permutation group.

9 Define complete bipartite graph.

10 Define Complete graph and Regular graph.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 a) With out constructing truth table find PDNF of $(P \rightarrow (Q \wedge R)) \wedge (\sim Q \wedge \sim R)$ [5]

b) Prove the following argument is valid "all dogs are carnivorous "
"some animals are dogs"
Therefore" some animals are carnivorous". [5]

OR

12 a) Is the following Conclusion is valid derive from contradiction method? [5]

$\sim q$
$P \rightarrow q$
$\underline{P \vee t}$
$\therefore t$

b) Construct PCNF 0f $(P \Leftrightarrow Q) \rightarrow R$. [5]

13 Use generating function method to Solve the recurrence relation $a_n+5a_{n-1}+6a_{n-2}=3n^2 \ \forall \ n\geq 2$ and $a_0=a_1=0$ [10]

OR

14 a) Solve the RR $a_n+4a_{n-1}+4a_{n-2}=5(-2)^n$ [5]
b) Find the coefficient of $X^3Y^3Z^2$ in $(2X-3Y+5Z)^8$ [5]

15 a) Draw the Hasse diagram representing the positive divisors of 36. [5]
b) Show that the relation 'R' defined by (a,b) R (c,d) iff a+d=b+c is an equivalence relation. [5]

OR

16 a) If X={1,2,3,4} and R= {(x,y)/x<y} Draw the graph of 'R' and also give its matix. [5]
b) Write the procedure to find the maximal compatability blocks to a compatability relation.[5]

17 Construct composition table for the roots of equation $x^4= 1$ and Show that it is a group with respect to operation multiplication. [10]

OR

18 a) If 'G' is a group then prove that $(a^{-1})^{-1}=a$. [5]
b) Prove that G ={0,1,2,3,4} is an abelian group of order 5 w.r.t addition modulo 5. [5]

19 Two graphs with the following adjacency list are given, show that they are isomorphic to each other. [10]

Graph G

vertices	Adjacent vertices
a	b,c
b	a
c	a,d,e
d	c
e	c

Graph H

vertices	Adjacent vertices
k	l
l	k,m,n
m	l
n	l,o
o	n

OR

20 Write the conditions to construct dual of the graph and construct dual of the following graph whose adjacency list given. [10]

vertices	Adjacent vertices
a	b,c
b	a,c,e
c	a,d,e,b
d	c
e	b,c