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, July 2022
Mathematical Foundations of Computer Science

(Common to CSE & IT)

Maximum Marks: 70 Date:23.07.2022 Duration: 3 hours

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 with an example

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 with example

10 Define the following terms with suitable example of i) Complete graph ii)regular graph

Part-B

Answer All the following questions. (10M X 5=50Marks)

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

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

OR

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

$\sim q$
$P \rightarrow q$
$P \vee t$
$\therefore t$

b) Construct PCNF 0f $(P \Leftrightarrow Q) \rightarrow R$. [5+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 $a_n+4a_{n-1}+4a_{n-2}=5(-2)^n$

b) Find the coefficient of $X^3Y^3Z^2$ in $(2X-3Y+5Z)^8$ [5+5]

15 a) Draw the Hasse diagram representing the positive divisors of 36. [5+5]

b) Show that the relation 'R' defined by (a,b) R (c,d) iff a+d=b+c is an equivalence relation.

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

b) Write the procedure to find the maximal compatability blocks to a compatability relation. [5+5]

17 a) Construct composition table for the roots of equation $x^4= 1$ and Show that it is a group with respect to operation multiplication.
b) Prove that every finite group of order 'n' is isomorphic to permutation group of degree 'n'. [5+5]

OR

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

19 a) Two graphs with the following adjacency list are given, Verify whether they are isomorphic to each other or not.

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

b) If 'G' be a graph with lvl=n vertices and lEl edges then prove that $\sum_{i=1}^{n} \deg(v_i)= 2|E|$. [5+5]

OR

20 a) State and prove Euler's formula in plane graphs
b) Write the conditions to construct dual of the graph and construct dual of the following graph whose adjacency list given. [5+5]

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