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 2024

MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

(Common to CSE & IT)

Maximum Marks: 70 Date:23.07.2024 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 $(P \vee Q) \rightarrow P$
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. (5X10M=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]

<table>
<tr><td></td><td>OR</td></tr>
<tr><td>14</td><td>Solve the RR $a_n+4a_{n-1}+4a_{n-2}=5(-2)^n$ [10]</td></tr>
<tr><td>15</td><td>a) Draw the Hasse diagram representing the positive divisors of 36.
b) Show that the relation 'R' defined by (a,b) R (c,d) iff a+d=b+c is an equivalence relation. [5+5]</td></tr>
<tr><td></td><td>OR</td></tr>
<tr><td>16</td><td>a) If X={1,2,3,4} and R= {(x,y)/x<y} Draw the graph of 'R' and also give its matrix.
b) Write the procedure to find the maximal compatibility blocks to a compatibility relation. [5+5]</td></tr>
<tr><td>17</td><td>Construct composition table for the roots of equation $x^4= 1$ and Show that it is a group with respect to operation multiplication. [10]</td></tr>
<tr><td></td><td>OR</td></tr>
<tr><td>18</td><td>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]</td></tr>
<tr><td>19</td><td>Two graphs with the following adjacency list are given, show that they are isomorphic to each other. [10]
Graph G
<table>
<tr><th>vertices</th><th>Adjacent vertices</th></tr>
<tr><td>a</td><td>b,c</td></tr>
<tr><td>b</td><td>a</td></tr>
<tr><td>c</td><td>a,d,e</td></tr>
<tr><td>d</td><td>c</td></tr>
<tr><td>e</td><td>c</td></tr>
</table>
Graph H
<table>
<tr><th>vertices</th><th>Adjacent vertices</th></tr>
<tr><td>k</td><td>l</td></tr>
<tr><td>l</td><td>k,m,n</td></tr>
<tr><td>m</td><td>l</td></tr>
<tr><td>n</td><td>l,o</td></tr>
<tr><td>o</td><td>n</td></tr>
</table></td></tr>
<tr><td></td><td>OR</td></tr>
<tr><td>20</td><td>State and prove Euler's formula in plane graphs. [10]</td></tr>
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