



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, February 2024

Mathematical Foundations of Computer Science
(CSE)

Maximum Marks: 70

Date: 21.02.2024 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 $(PVQ) \rightarrow P$
- 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) 0 and 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 $x_1 \geq 2, x_2 \geq 3, x_3 \geq 10, x_4 \geq 4$
- 7 Show that binary operation $*$ defined 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) Without constructing truth table find PDNF of $\{(P \rightarrow (Q \wedge R)) \wedge (\sim Q \wedge \sim R)\}$ [5M]
b) Prove the following argument is valid "all dogs are carnivorous"
"some animals are dogs"
Therefore "some animals are carnivorous". [5M]
- OR
- 12 a) Is the following Conclusion is valid derive from contradiction method? [5M]
$$\begin{array}{l} \sim q \\ P \rightarrow q \\ \hline PV\ t \\ \therefore t \end{array}$$

b) Construct PCNF of $(P \Leftrightarrow Q) \rightarrow R$. [5M]
- 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 $a_0 = a_1 = 0$. [10M]
- OR

14	a) Solve the RR $a_n + 4a_{n-1} + 4a_{n-2} = 5(-2)^n$ [5M] b) Find the coefficient of $X^3Y^3Z^2$ in $(2X - 3Y + 5Z)^8$ [5M]												
15	a) Draw the Hasse diagram representing the positive divisors of 36. [5M] b) Show that the relation 'R' defined by $(a,b) R (c,d)$ iff $a+d=b+c$ is an equivalence relation. [5M]												
	OR												
16	a) If $X = \{1,2,3,4\}$ and $R = \{(x,y)/x < y\}$ Draw the graph of 'R' and also give its matrix. [5M] b) Write the procedure to find the maximal compatibility blocks to a compatibility relation. [5M]												
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. [5M] b) Prove that every finite group of order 'n' is isomorphic to permutation group of degree 'n'. [5M]												
	OR												
18	a) If 'G' is a group then prove that $(a^{-1})^{-1} = a$ [5M] b) Prove that $G = \{0,1,2,3,4\}$ is an abelian group of order 5 w.r.t addition modulo 5. [5M]												
19	If 'G' be a graph with $ V =n$ vertices and $ E $ edges then prove that $\sum_{i=1}^n \deg(v_i) = 2 E $ [10M]												
	OR												
20	a) State and prove Euler's formula in plane graphs. [5M] b) Write the conditions to construct dual of the graph and construct dual of the following graph whose adjacency list given. [5M]												
	<table border="1"> <thead> <tr> <th>vertices</th><th>Adjacent vertices</th></tr> </thead> <tbody> <tr> <td>a</td><td>b,c</td></tr> <tr> <td>b</td><td>a,c,e</td></tr> <tr> <td>c</td><td>a,d,e,b</td></tr> <tr> <td>d</td><td>c</td></tr> <tr> <td>e</td><td>b,c</td></tr> </tbody> </table>	vertices	Adjacent vertices	a	b,c	b	a,c,e	c	a,d,e,b	d	c	e	b,c
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