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**G. H. Raisoni College of Engineering and Management, Pune.**

(An Autonomous Institution)

S.Y B. Tech (IT Engineering) (Term-III)

CAE-1 WINTER-2020 ( 2020 Pattern)

Graph Theory and Combinotrics(BITL19203)

**[Time:1Hour] [Max. Marks-20]**

**COURSE OUTCOME:**

1. Describe the fundamental concepts of discrete mathematics to solve the engineering problems.
2. Identify, select & apply the appropriate data structures to solve real life problems.
3. Apply the counting principles to determine probabilities.
4. Analyze concepts of number theory.
5. Understand concepts of groups and rings.

***Instructions to the candidates:***

1. ***(CO1/CO2/CO….)at the beginning of question/sub question indicates the course outcome related to the question.***
2. ***All questions compulsory.***
3. ***Neat diagrams must be drawn wherever necessary.***
4. ***Figures to the right indicate full marks.***
5. ***Assume suitable data, if necessary.***
6. ***Other Instructions, if any.***

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| *CO* | *Sub*  *Question* |  |  |
|  |  |  |  |
| CO1 | *a)* | In a class of 40 students, 12 enrolled for both French and German. 22 enrolled for German. If the students of the class enrolled for at least one of the two subjects, then how many students enrolled for only French and not German? | [2] |
|  |  |  |  |
|  | *b)* | In a class 50% of the students enrolled for Art and Craft and 60% enrolled for Music. If 20% of the students enrolled for both Art & Craft and Music, what % of the students of the class did not enroll for either of the two subjects? | [2] |
|  |  |  |  |
|  | *c)* | Convert the following logical expression into CNF  ¬( (¬ p v q)^ r ^ (p->q) | [3] |
|  |  |  |  |
|  | *d)* | Show that the following logical expression is Tautology  [p^(q->r)]->(q->r) | [3] |
|  |  |  |  |
| CO2 | *a)* | Let A={1,2,3,4,5} define relation R on constraint {(a,b)|a+b is even}. Then show that relation R is an equivalence relation. | [3] |
|  |  |  |  |
|  | *b)* | Let A={1,2,3,4} define relation R on constraint {(a,b)|a>=b} and find the transitive closure of relation R using Warshall’s algorithm. | [3] |
|  |  |  |  |
|  | *c)* | Solve the following recurrence relation  an=2an−1+6an−2 with initial values a0=a1=1 | [4] |
|  |  | OR |  |
|  | *d)* | Let A = {1, 2, 3, 9, 18} and consider the ‘divides’ relation A: For all a, b ∈A, a|b ⬄ b = ka for some integer k. determine relation is POSET and draw the Hasse Diagram. | [4] |