**End TermAssessment– Nov/Dec 2020**

**Semester –III**

**B.Tech. - CSE**

**Subject Code: CS 2003** **Subject Name: Discrete Structures**

**Duration: 2 hours (including time for uploading)** **Max. Marks: 50**

**(10 Minutes Max Grace time)**

**Instructions**

- **Write name and registration number, page number, on all the pages, convert into one PDF, tag it with your registration number_Name_subjectcode_subject title**
- **The Assessment consists of 2 sections**
  - **Part A contains 10questions of 2marks each and all questions are compulsory.**
  - **Part B consists of 4 questions of 10 marks each, out of which 3 questions to be attempted.**
- **Hand written responses to be submitted/uploaded as scanned pages of answer sheets (max. 5 pages) within the mentioned duration. 6th page and onwards won't be evaluated**

**PART – A**

**2 * 10 =20 Marks**

**(Each answer- Word Limit- 50 Words)**

1. Is (~P ^ (P V Q)) → Q a tautology?
2. Is there any proposition imply on a tautology and why the contradiction imply on any proposition?
3. How many different strings of length 'n' can be formed from the English alphabets?
4. Find the recurrence relation whose solution is **$S(K) = 5 .2^k$**
5. In a Boolean algebra prove that **(a^b)`=a` v b`**
6. Draw the complete graph **$K_5$.**
7. What is the Travelling Salesmen Problem?
8. Prove that every subgroup of an abelian group is normal.
9. "if G is a finite group and H is a subgroup of G, then the order of H divides the order of G" what is the above statement meant?
10. $\left(x_1 \wedge \overline{x_2}\right) \vee \left(x_1 \wedge x_2\right) \vee \left(\overline{x_1} \wedge x_2\right)$.

    What is the Boolean expression in the notation of above logic design?

**PART – B**

**10 * 3 = 30 Mark**

**(Each answer- Word limit- 250 words)**

**11.** Use indirect method of proof to prove that **(∀ x) (P(x) V Q(x)) → (∀x) P(x) V (~x) Q(x).**

**12. Prove that**

$\frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + --- + \frac{1}{\sqrt{n}} > \sqrt{n}$ *for* $n \geq 2$ using principle of mathematical induction.

**13.** Find the solution to the recurrence relation **$a_n=6a_{n-1} -11a_{n-2} +6a_{n-3}$** with the initial condition **$a_0=2$, $a_1=5$ and $a_2=15$.**

**14.** Draw the expression tree and then write out the preorder traversal of the tree

**(a). x *x- 4 y * z**

**(b). ((s x + q) x + r) x + p**

**(c). xy+xz**

**(d). t (h+r)**

**(e). xz+y**