அரசினர் ஆடவர் கலைக்கல்லூரி (தன்னாட்சி), நந்தனம், சென்னை – **35.**

CODE: **196602** TIME: 3 Hrs

NOVEMBER 2020 MAX. MARKS: 50

PART A *(10 x 2=20)*

*Answer any **TEN** questions.*

1. What is a statements?
2. What is Disjunctive Normal Forms.
3. Define Binary number.
4. What is a Set?
5. Negate the following statements (a) Ottawa is a small town.(b) Every city in Canada is clean
6. What is Recursion function?
7. What is a Graph?.
8. Define Networks.
9. What is Boolean Algebra?.
10. Define Turing machines.
11. State addition theorem for dependent events.
12. A perfect dice is tossed twice. Find the probability of getting a total of 9.

PART B *(2 x5=10)*

*Answer any **TWO** questions*

13. Construct the truth table for $(P\rightarrow Q) \wedge (Q \rightarrow P)$.
14. Show that if m is an odd integer then m^2 is an odd integer
15. Prove that $1 + 2 + \ldots\ldots\ldots. + n = n(n+1) / 2$.
16. Show that $(x) (P(x) \rightarrow Q (x) \wedge (x) (Q(x)\rightarrow R(x) \Rightarrow (x) (P(x) \rightarrow R(x))$.
17. Find the recurrence relation for $D(K) = 2K+7$
18. Find a context-free grammer G which generates the language L which consists of all words on a and b with twice as many a's as b's.
19. Prove that $n! > 2^n$ for $n\geq 4$.
20. State addition theorem for dependent events.

PART C *(2x10=20)*

*Answer any **TWO** questions*

21 a) What is a Equivalence relation?

b) Prove the following binary relation on the given sets S which has equivalence relation

$S = \mathbb{Z}$, x y $\Leftrightarrow$ x – y is an integral multiple of 3.

22. Show that the following premises are inconsistent.(a) If jack misses many classes through illness, then he fails high school.(b)If jack fails high school, then he is uneducated. (c) If jack reads a lot of books, then he is not uneducated. (d) Jack misses many classes through illness and reads a lot of books.
23. Prove that $F(n + 4) = 3F(n+2) – F(n)$ for all $n \geq 1$ using Recurrence Relation $F(n+2) = F(n) + F(n+1)$.
24. Explain about the every regular set is accepted by a finite state automation.
25. Find the language $L (G_5) = \{ a^n b a^m /n,m\geq 1\}$ is generated by the grammar $G_5 = \langle \{S, A, B, C\}, \{a,b\} , S, \Phi \rangle$ and the productions is $S \rightarrow aS$, $S \rightarrow aB$, $B\rightarrow bC$, $C\rightarrow aC$, $C\rightarrow a$. to be defective. What is the probability that, it came from unit D?
