

[Time:2.30 Hrs]

[Marks:75]

Please check whether you have got the right question paper.

- N.B:
1. All question are compulsory.
 2. Figures to the right indicate full marks.

Q.1 Attempt any four of the following**20**

- A Solve $a_{r+2} - a_{r-2} = 0$
- B Determine whether the function is bijective from \mathbb{R} to \mathbb{R} , $f(x) = x^2 + 1$
- C Let R be a relation on \mathbb{Z} , defined by xRy iff $x+6y$ is divisible by 7, for $x,y \in \mathbb{Z}$. Show that R is an equivalence relation on \mathbb{Z} .
- D Let $A = \{1,2,3,4,5\}$ and R be a partial order relation defined as $R = \{(1,1), (2,2), (3,3), (4,4), (5,5), (5,3), (3,1), (4,3), (4,2), (4,1), (2,1)\}$. Find Hasse diagram of poset A .
- E Verify whether the function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined as $f(x) = 2x+5$ for all $x \in \mathbb{N}$,
 (i) One-to-One (ii) Onto , Does the inverse function exist.
- F Solve $a_n - a_{n-2} = 0$

Q.2 Attempt any four of the following**20**

- A An investigator interviewed 100 interviewers to determine their skills, expert in C language , expert in oracle, expert in V.B. Report occurred is 10 are skilled in all three, 20 are skilled in C and V.B. 30 are skilled in V.B and oracles, 25 are skilled in C and Oracle, 12 are skilled in C only, 5 are skilled in V.B. only and 8 are skilled in Oracle only. Then (i) How many are skilled in at least one. (ii) How many are unskilled. (iii) How many are skilled in C but not V.B. (iv) How many are skilled in V.B and Oracle but not C.
- B How many three light numbers are there which are even and have no repeated digits?
- C How many ways are there to distribute hand of 6 cards to each four players from the standard deck of 52 cards?
- D Among 100 students, 55 students got distinction in first year, 30 got distinction in second year, 15 got distinction in both years. Then how many students got distinction in at least one year.
- E What is the coefficient of $x^{12}y^{13}$ in the expansion of $(2x - 3y)^{25}$?

Q.3 Attempt any four of the following **20**

-
- ```

graph TD
 a((a)) --- b((b))
 a --- c((c))
 a --- d((d))
 b --- e((e))
 b --- f((f))
 e --- i((i))
 e --- j((j))
 j --- m((m))
 j --- n((n))
 d --- g((g))
 d --- h((h))
 g --- k((k))
 g --- l((l))

```
- T

- Q.4 Attempt any three of the following** **15**

- \*\*\*\*\*