*

1 point

Assuming that repetitions are not permitted, how many four digit numbers can be formed from the six digits 1, 2, 3, 5, 7, 8?

(a) 360 (b) 300 (c) 280 (d) 340

- (●) A
- ( ) B
- ( ) C
- ( ) D

*

1 point

There are 6 boys and 4 girls in a group. In how many ways can they sit in a row?

(a) 10! (b) 2 x 6! x 4! (c) 6! x 4! (d) 2 x 10!

- (●) A
- ( ) B
- ( ) C
- ( ) D

*

1 point

If 9 letters A1, A2,... A9 are placed in a circle. Then how many different circular arrangements are possible?

(a) 5! (b) 6! (c) 8! (d) 9!

- [ ] A
- [ ] B
- [x] C
- [ ] D

*

1 point

How many permutations of the letters A, B, C, D, E, F, G contains the strings BA and GF?

(a) 120 (b) 720 (c) 24 (d) 6

- [x] A
- [ ] B
- [ ] C
- [ ] D

*

1 point

From a club consisting of 10 men and 6 women, in how many ways can we select a committee of 6 men and 4 women?

(a) C(6,10) C(6,4) (b) C(10,6) C(4,6) (c) C(10,6) C(6,4) (d) C(10,6)

- A
- B
- C
- D

*

1 point

If A={x: $1 \le x \le 250$ and x is divisible by 2}, B={ x: $1 \le x \le 250$ and x is divisible by 5}, |A|=125 and |B|=50 then the cardinality of $A \cap B$ is

(a) 10 (b) 17 (c) 41 (d) 25

- A
- B
- C
- D

*

1 point

If |A|=50 and |B|=35, $|A \cap B|$=7 then $|A \cup B|$ is

(a) 50 (b) 78 (c) 35 (d) 70

- A
- (●) B
- C
- D

*

1 point

If a|bc , a and b are co-prime then

(a) a|b (b) a|(b-c) (c) a|c (d) a|(b+c)

- A
- B
- (●) C
- D

*

1 point

If the gcd (7,5)=1 then the gcd (28,5) is

(a) 1 (b) 2 (c) 4 (d) 5

- (●) A
- ( ) B
- ( ) C
- ( ) D

*

1 point

If the gcd(3587, 1819)=17, then gcd(107,211) is

(a) 2 (b) 1 (c) 10 (d) 4

- ( ) A
- (●) B
- ( ) C
- ( ) D

*

1 point

If gcd (337500,21600)=2700, then lcm (337500,21600) is

(a) 337500 (b) 21600 (c) 2700 (d) 2700000

- A
- B
- C
- D

*

1 point

If each 2, 3, 5 is co-prime to 77 then gcd(30,77) is

(a) 2 (b) 3 (c) 5 (d) 1

- A
- B
- C
- D

*

1 point

If gcd (12345, 54321)=3 then gcd (89x12345,89x54321) is

(a) 265 (b) 3 (c) 267 (d) 297

- A
- B
- C
- D

*

1 point

If gcd (6,4)=gcd(10,4) then the gcd(16,4) is

(a) 2 (b) 4 (c) 8 (d) 1

- A
- B
- C
- D

*

1 point

The number of primes less than or equal to 20 is

(a) 4 (b) 8 (c) 12 (d) 16

- A
- B
- C
- D

*

1 point

Let p and q be two propositions then $\neg(p \rightarrow q) \equiv$

(a) $p \vee q$ (b) $p \wedge q$ (c) $p \wedge \neg q$ (d) $\neg p \wedge q$

- A
- B
- C
- D

*

1 point

The compound propositions p and q are called logically equivalent. If ----- is a tautology.

(a) $p \leftrightarrow q$ (b) $p \rightarrow q$ (c) $\neg(p \vee q)$ (d) $\neg p \vee \neg q$

- (●) A
- ( ) B
- ( ) C
- ( ) D

*

1 point

$p \rightarrow \neg q$ is equivalent to

(a) $p \vee q$ (b) $p \vee \neg q$ (c) $\neg p \vee q$ (d) $\neg(p \wedge q)$

- ( ) A
- ( ) B
- ( ) C
- (●) D

*

1 point

$p \vee q$ is logically equivalent to

(a) $\neg p \rightarrow \neg q$ (b) $q \rightarrow p$ (c) $\neg q \rightarrow \neg p$ (d) $\neg p \rightarrow q$

- A
- B
- C
- D

*

1 point

$\neg(p \leftrightarrow q)$ is logically equivalent to

(a) $p \leftrightarrow q$ (b) $p \leftrightarrow \neg q$ (c) $\neg p \leftrightarrow \neg q$ (d) $p \rightarrow q$

- A
- B
- C
- D

*

1 point

$p \wedge q$ is logically equivalent to

(a) $\neg(p \rightarrow \neg q)$ (b) $(p \leftrightarrow \neg q)$ (c) $\neg p \rightarrow \neg q)$ (d) $\neg p \rightarrow q)$

- (●) A
- ( ) B
- ( ) C
- ( ) D

*

1 point

Which of the following statement not correct

(a) $p \vee q \equiv \neg q \vee p$ (b) $\neg(p \wedge q) \equiv \neg q \vee \neg p$ (c) $p \vee \neg p \equiv T$ (d) $p \wedge \neg p \equiv F$

- (●) A
- ( ) B
- ( ) C
- ( ) D

*

1 point

$(p \to q) \wedge (p \to r)$ is logically equivalent to

(a) $p \to (q \wedge r)$ (b) $p \to (q \vee r)$ (c) $p \wedge (q \vee r)$ (d) $p \vee (q \wedge r)$

- (●) A
- ( ) B
- ( ) C
- ( ) D

*

1 point

$\neg(p \vee q) \equiv \neg q \wedge \neg p$ name of the law is

(a) Idempotent law (b) associative law (c) De Morgan's law (d) dominant law

- ( ) A
- ( ) B
- (●) C
- ( ) D

*

1 point

$(p \to q) \vee (p \to r) \equiv p \to ------$

(a) $p \wedge r$ (b) $q \vee r$ (c) r (d) q

- A
- B
- C
- D

*

1 point

$p \to (p \vee q)$ is

(a) tautology (b) contradiction (c) negation (d) bi conditional proposition

- A
- B
- C
- D

*

1 point

The dual of $p \vee (q \wedge r)$

(a) $p \vee (q \wedge r)$ (b) $p \wedge (q \wedge r)$ (c) $p \vee (q \vee r)$ (d) $p \wedge (q \vee r)$

- A
- B
- C
- D

*

1 point

$(p \wedge q) \Rightarrow$

(a) $\neg p$ (b) $\neg q$ (c) p (d) $\neg(p \wedge q)$

- A
- B
- C
- D

*

1 point

. What is the negation of the statement "Mumbai is not capital of India"

(a) Delhi is capital of India (b) Delhi is not capital of India (c) Mumbai is capital of India (d) Tamilnadu is not capital of India

- A
- B
- C
- D

*

1 point

.The proposition $p \wedge (\neg p \vee q)$ is

(a) Tautology (b) $\Leftrightarrow (p \wedge q)$ (c) $\Leftrightarrow (p \vee q)$ (d) contradiction

- A
- B
- C
- D

Part-B (Answer any FIVE questions 5x4=20)

Instructions:

Part-B descriptive questions should be answered in A4 white sheets and scanned PDF should be uploaded in 'ADD FILE'. The work sheet should contain the following:

(a) Register number and name in each and every page along with watermark (Register number).

(b) File name should be 'CT1-425' (if your register number is RA2021....425, the last three digits of your register number).

*

20 points

31. Prove by mathematical induction that $n^3 - n$ is divisible by 6.

32. A man hiked for 10 hours and covered a total distance of 45 km. It is known that he hiked 6km in the first hour and only 3 km in the last hour . Show that he must have hiked at least 9 km with in the certain period of 2 consecutive hours.

33. There are 300 students in an engineering college. Of these 200 have taken a course in FORTRAN, 100 have taken a course in C and 25 have taken in Java. Further 80 have taken courses in both FORTRAN and C. 25 have taken courses in both C and java and 30 have taken courses in both FORTRAN and Java. If 15 have taken all the three courses. How many of these 300 students have not taken a course in any of these three courses?

34. Find the integers m and n such that 3587m+1819n=17

35. Prove the equivalence by proving its equivalence of dual $(p \vee q) \rightarrow r \equiv (p \rightarrow r) \wedge (q \wedge r)$

36. Prove the following implication by using the truth $a \rightarrow (b \rightarrow c) \Rightarrow (a \rightarrow b) \rightarrow (a \rightarrow c)$

37. Without using the truth table prove that $(p \vee q) \wedge (p \rightarrow r) \wedge (q \rightarrow r) \Rightarrow r$

CT2-102 - PULAV...