H Roll No. 2392164

TBC–204/TBI–204

B. C. A./B. Sc. (IT)
(SECOND SEMESTER)
MID SEMESTER
EXAMINATION, March, 2024

DISCRETE MATHEMATICS

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any ***one*** of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) Find n, if : (CO1)

(i) ${}^{n}P_4 : {}^{(n+1)}P_5 = 1:9$

(ii) $P(n,4) = 20 \times P(n,2)$

OR

(b) How many signals can be produced with 6 flags of different column such that : (CO1)

(i) atmost three flags can be used for a signal.

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(ii) exactly three flags are to be used for a signal.

(iii) at least three flags are to be used for a signal.

(iv) any number of flags may be used for a signal.

2. (a) (i) If ${}^{16}C_r = {}^{16}C_{(r+2)}$, find ${}^{r}C_4$. (CO1)

(ii) If ${}^{24}C_r = {}^{24}C_{(2r+3)}$, find r.

OR

(b) Use Binomial theorem to prove that : (CO1)

(i) $3^n = \Sigma_{r=0}^{n} C(n,r)2^n$

(ii) $C(n,1) + 2C(n,2) + \ldots\ldots + nC(n,n)n.2^{n-1}$

3. (a) There are ten points in a plane, no three of which are in the same straight line, excepting 4 points, which are collinear. Find the (i) number of straight lines obtained from the pairs of these points; (ii) number of triangles that can be formed with the vertices as these points. (CO1)

OR

(b) Explain rules of inference with suitable examples. (CO2)

4. (a) Use truth table to prove that distribution law : (CO2)

$$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$$

OR

(b) Check whether the following statement is a tautology or not ? (CO2)

$$((p \vee q) \wedge (p \to r) \wedge (q \to r)) \to r$$

5. (a) Show that $\sim r$ is a valid conclusion from the premises $p \to \sim q, r \to p, q$: (CO2)

(i) with truth table

(ii) without truth table

OR

(b) Prove that the following propositions are tautology : (CO2)

(i) $p \vee \sim p$

(ii) $\sim(p \wedge q) \vee q$