Semester II (B.Tech.)

Jaypee University of Engineering & Technology, Guna

T-2 (Even Semester 2022)
18B11MA211 – Discrete Mathematics

Maximum duration: 1 Hour 30 minutes

Maximum Marks:

Notes:
1. This question paper has five questions.
2. Write relevant answers only.
3. Do not write anything on question paper (Except your Er. No.).

Marks

Q1. (a) Investigate the validity of the following argument:
$$p \rightarrow \neg q, \qquad r \rightarrow q, \qquad r \vdash \quad \neg p$$

(b) If the domain of each variable x consists of all real number, determine the truth value of the following statements:
(i) $\exists x \ (x^2 = 2)$ (ii) $\forall x \ (x^2 \neq x)$ [5

Q2. Show that the set of all positive rational numbers forms an abelian group under operation '*' defined by $a * b = \dfrac{a.b}{2}$. [5

Q3. If R is the additive group of real numbers and R^+ is the multiplicative group of positive real numbers, prove that the mapping $f: R \rightarrow R^+$ defined by $f(x) = 2^x$, $\forall x \in R$ is an isomorphism. [

Q4. Verify that the algebraic structure $(\{0, 2, 4, 6, 8\}, +_{10}, \times_{10})$ under addition and multiplication (mod 10) is a ring. Does there exist unity element? Is it a ring with zero divisors? [

Q5. (a) Show that the sum of degrees of all the vertices in a graph G is even.

(b) Find the adjacency matrix and incidence matrix of the following multi graph:

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