

TOPOLOGY II (MTH-516/616)

QUIZ (30/01/2019)

Time: 50 minutes

Maximum Marks: 10

Attempt all questions. Use separate page for each answer.

Problem 1. Let X be a star shaped space and \mathcal{Z} denotes a chain complex such that $\mathcal{Z}_0 = \mathbb{Z}$ and $\mathcal{Z}_i = 0$ for $i > 0$. Let $\epsilon : \Delta(X) \rightarrow \mathcal{Z}$ be the augmented map (defined in class). Show that ϵ is chain equivalence. (4)

Problem 2. Construct an isomorphism (3)

$$H_n(X) \oplus H_n(Y) \rightarrow H_n(X \sqcup Y),$$

where $X \sqcup Y$ denotes disjoint union of X and Y .

Problem 3. Use the Mayer-Vietoris sequence to compute the homology groups of any one of the following: (3)

- (1) Sphere \mathbb{S}^n ,
- (2) Projective plane \mathbb{P}^2 ,
- (3) Klein bottle \mathbb{K}^2 ,
- (4) Torus \mathbb{T}^2