

**HOME ASSIGNMENT (2025 Batch)**  
**M.A./M.SC. IN MATHEMATICS**  
**(FIRST SEMESTER)**  
**CENTRE FOR DISTANCE AND ONLINE EDUCATION**  
**DIBRUGARH UNIVERSITY**

*(Full Marks 20 for each course)*

(ALL THE QUESTIONS GIVEN BELOW ARE COMPULSORY)

**Course : MATH – 101 (Real Analysis)**

*Assignment – 1*

*Marks – 5+5=10*

- Q.1. (a) Define complete metric space and show that subspace of a complete metric space is closed.
- (b) Give an example of a subspace of a complete metric space which is not complete under the same metric. Justify your answer.

*Assignment – 2*

*Marks – 5+5=10*

- Q.2. (i) State and prove the second mean value theorem.
- (ii) Assume that  $f_n \rightarrow f$  uniformly on  $S$ ,  $g_n \rightarrow g$  uniformly on  $S$ . Prove that  $f_n + g_n \rightarrow f + g$  uniformly on  $S$ .

**Course : MATH – 102 (Algebra and Logic)**

*Assignment – 1*

*Marks – 5+5=10*

- Q.1. (i) Prove that a group of order  $p^2$  ( $p$  is a prime) is abelian.
- (ii) Let  $T: R^3 \rightarrow R^3$  be the linear mapping defined by  $T(x, y, z) = (x+2y, y-z, x+2z)$ . Find a basis and dimension of the *image*  $T$  and *ker*  $T$ .

*Assignment – 2*

*Marks – 10*

- Q.2. (a) Construct a truth table of the following formula  
 $(P \leftrightarrow Q) \leftrightarrow (P \rightarrow Q) \wedge (Q \rightarrow P)$

*Marks – 5*

- (b) (i) Define consequence in mathematical logic.

*Marks – 3+1+1=5*

- (ii) Translate into symbols

“Not all birds can fly”.

“Some people are stupid”.

**Course : MATH – 103 (Differential Geometry)**

*Assignment – 1*

*Marks – 10*

- Q.1. Prove that the edge of regression of the polar developable of a space curve is the locus of the centre of spherical curvature.

*Assignment – 2*

*Marks – 5+5=10*

- Q.2. Write short notes on

- (a) Regular and singular points

- (b) Parametric curve.

**Course : MATH – 104 (Mechanics)**

*Assignment – 1*

*Marks – 10*

Q.1. Discuss the concept of Lagrangian for double pendulum.

*Assignment – 2*

*Marks – 2+8=10*

Q.2. State and prove the Jacobi's identity.

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