**GOVERNMENT OF INDIA**
**MINISTRY OF EARTH SCIENCES**
**LOK SABHA**
**STARRED QUESTION NO. *266**
**TO BE ANSWERED ON WEDNESDAY, 19TH MARCH, 2025**

**MATSYA-6000**

*266. SHRI BIBHU PRASAD TARAI:
SHRI JAGDAMBIKA PAL:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) the details of the safety measures incorporated into the Matsya-6000 to ensure the well-being of the scientists operating at extreme ocean depths;
(b) the manner in which the Government plans to address issues like underwater voice communication inefficiencies;
(c) whether there are any plans to collaborate with international oceanographic institutes for knowledge exchange and skill enhancement related to deep-sea submersible operations; and
(d) if so, the details thereof?

**ANSWER**
THE MINISTER OF STATE (INDEPENDENT CHARGE) FOR
MINISTRY OF SCIENCE AND TECHNOLOGY
AND EARTH SCIENCES
(DR. JITENDRA SINGH)

(a) to (d): A Statement is laid on the Table of the House.

STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY TO (a) to (d) OF STARRED QUESTION NO. *266 REGARDING "MATSYA-6000" TO BE ANSWERED ON MARCH 19, 2025

(a) Matsya-6000 is India's flagship human submersible aimed to carry three persons to a depth of 6000 meters, developed by the National Institute of Ocean Technology (NIOT), Chennai, under the Ministry of Earth Sciences, as part of the Samudrayaan project of the Deep Ocean Mission launched by the Government of India in 2021.

Matsya- 6000 (2.1-meter diameter personnel sphere) which houses the crew is made of a Titanium alloy and maintains an inside pressure of 1 atmosphere (atm). Further, the personnel sphere spherical pressure hull is tested to bear 720 bars of pressure, which is 1.2 times more than the pressure expected at 6000 meters. All human safety parameters are continuously monitored during the operations and are communicated to the ship-based Mission Control Centre through an acoustic modem, with the pilot communicating updates through the Underwater Acoustic Telephone every 30 minutes. It is designed for operations of up to 12 hours, with an emergency endurance of up to 96 hours, supported by a DNV-certified Human Support and Safety System (HSSS). DNV (Det Norske Veritas) is an internationally accredited registrar and classification society headquartered in Norway. The HSSS maintains the oxygen level at 20 per cent, the $CO_2$ level at less than 1000 ppmv (part per million by volume), and controls humidity by measurement sensors to ensure human life comfort and safety.

The submersible is designed to perpetually float unless made to dive through water filling in its ballast tanks. It has three different combinations of weight drop mechanisms for ascending to the surface to maintain the safety. It has additional emergency power, control, and communication devices for emergency scenarios.

(b) Matsya-6000 is equipped with an Underwater Acoustic Telephone that has been operated and tested for operations up to 10,000 meters depth of human operation vehicles, in addition to a sub-phone rated for 500-meter depth operations. The voice communication is designed to be utilised every 30 minutes with the submersible pilot and the Mission Control Centre so that continuous communication is ensured.

(c) Yes Sir.

(d) NIOT has signed MoU with the IFREMER (French Research Institute for Exploitation of the Sea), France, facilitating scientific knowledge exchange and participation with the French human scientific submersible for 6000 meters depth named NAUTILE.

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