GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION No. **25**
TO BE ANSWERED ON THURSDAY, DECEMBER 05, 2013

SEISMIC FORECASTING

25. DR. KIRODI LAL MEENA:

Will the Minister of **EARTH SCIENCES** be pleased to state:

a) whether the Government has adopted new technological skills and programme for research on seismology and seismic forecasting;
b) if so, the details thereof;
c) whether frequency of occurrence of earthquake in the country has increased;
d) if so, the areas where occurrence of earthquake has been noticed during the last one year in the country and the details thereof with intensity;
e) whether the Government proposes to establish a dedicated seismological research laboratory;
f) if so, the details thereof;
g) whether the Government has made efforts to identify seismic zones and reassess seismic zones; and
h) if so, the details thereof?

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ANSWER
MINISTER FOR MINISTRY OF SCIENCE AND TECHNOLOGY AND
MINISTRY OF EARTH SCIENCES
(SHRI S. JAIPAL REDDY)

(a) Yes Madam in respect of seismological research and studying earthquake pre-cursors but not on seismic forecasting per se.

(b) To study earthquake precursors in an integrated manner, India had set up Multi - Parameter Geophysical Observatories (MPGOs) at Ghuttu, Central Himalaya and Shillong, Eastern Himalaya. Supplemented by the dense network of broadband seismometers, the MPGOs are designed to record precursory signals resulting from stress-induced changes in density, magnetization, resistivity, seismic wave velocity, fracture propagation, crustal deformation, electromagnetic and radon gas emission as well as fluctuations in hydrological parameters. In addition, 3- field stations located at hot spring and mud-volcano at Bakreswar, West Bengal; Tatta Pani (J & K) and Baratang (A & N Islands) were upgraded with advanced instrumentation for recording hourly concentration changes in stable gases as well as the radioactive constituents. During the last 12-months, the installed network recorded 5-anomalies that were correlated with regional earthquakes of magnitude $\geq$4.0M that have occurred in hypocentral distances ranging from 250-1500Kms.

Preparatory level pilot studies have been initiated to carry out scientific investigations and select the suitable site for deep borehole drilling in the Koyna-Warna region. The investigations include, Seismological, Geophysical (seismic, gravity, magnetic), LIDAR, geomorphology and structural geological studies, apart from a few shallow (~ 1 km) exploratory boreholes.

(c) No apparent increase in the frequency of incidents of earthquake in the country has been noticed.

(d) Does not arise.

(e) Yes Madam.

(f) The Earth System Science Organization (ESSO) of the Ministry of Earth Sciences (MoES) is in the process of re-structuring the operational seismology and earthquake research in the country under the umbrella of a dedicated Center in Seismology. The broad objectives of the Center are as follows:

i) Provide earthquake (M: 3.0 and above) related information to all user agencies in shortest possible time.
ii) Provide earthquake hazard and risk related products of specific region, required by various agencies for institutionalizing various preventive measures for design and construction of earthquake resistant structures, land use planning and for enacting building bye-laws towards minimizing damage to property and loss of lives due to earthquakes.
iii) Carry out research in pure and applied seismology and earthquake precursory phenomena, earthquake processes and modeling.

(g) Yes Madam.

(h) Earthquake prone areas of the county have been identified on the basis of scientific inputs relating to seismicity, earthquakes occurred in the past and tectonic setup of the region. Bureau of Indian Standards [IS-1893 (Part-1): 2002], based on the past seismic activity history, grouped the country into four seismic zones, viz. Zone-II (least active seismic zone), Zone-III (moderately active seismic zone), Zone-IV (high active(severe) seismic zone) and Zone–V (highest active (most severe) seismic zone). Details of the various geographical areas falling under various categories of seismic zones are presented in the Annexure.

Annexure

Seismic Zones in India

Seismic Zone	Region
Zone – V [highest active (most severe) seismic zone]	Entire north eastern India, parts of Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Rann of Kutch in Gujarat, part of North Bihar and Andaman & Nicobar Islands.
Zone – IV [high active (severe) seismic zone]	Remaining parts of Jammu and Kashmir and Himachal Pradesh, National Capital Territory (NCT) of Delhi, Sikkim, Northern Parts of Uttar Pradesh, Bihar and West Bengal, parts of Gujarat and small portions of Maharashtra near the west coast and Rajasthan.
Zone – III (moderately active seismic zone)	Kerala, Goa, Lakshadweep islands, remaining parts of Uttar Pradesh, Gujarat and West Bengal, Parts of Punjab, Rajasthan, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Maharashtra, Orissa, Andhra Pradesh, Tamilnadu and Karnataka.
Zone – II (least active seismic zone)	Remaining parts of country.