

at the bottom portion of the Russian Cryogenic Stage, due to structural failure of the Lower Shroud.

Based on the suggestions made by the failure analysis committees, ISRO has implemented the modifications and improvements in GSLV, which include independent inspection and quality checks for all critical components and sub-assemblies, change of bearing housing material, revision of tolerances and seal clearances of Fuel Booster Turbo Pump of Cryogenic Engine, redesign of the Cryogenic Stage Lower Shroud, revision of connector mounting scheme and wire tunnel configuration.

After implementing the modifications and improvements in GSLV, the next flight GSLV-D5 was successfully launched on 5th January 2014 from Satish Dhawan Space Centre, Sriharikota.

(c) Yes, Sir. India has prepared its own indigenous cryogenic engines meant for GSLV and flown in GSLV-D3 and GSLV-D5. Cryogenic engine required for next flight GSLV-D6 is also prepared and is undergoing acceptance testing.

Indigenous production of cryogenic engine

2407. DR. R. LAKSHMANAN: Will the PRIME MINISTER be pleased to state :

(a) whether indigenous production of cryogenic engine is still at a very nascent stage *i.e.* at the design level only, if so, the details thereof;

(b) the tentative time by which production of cryogenic engine would be a reality; and

(c) the details of the funds allocated for this purpose in the Twelfth Five Year Plan?

THE MINISTER OF STATE IN THE DEPARTMENT OF SPACE (DR. JITENDRA SINGH): (a) No, Sir. The Cryogenic Engine of 7.5 Tonne thrust meant for Geosynchronous Satellite Launch Vehicle (GSLV) is indigenously produced and successfully flight tested in GSLV-D5 flight on 5th January, 2014. The Cryogenic Engine of higher thrust (20 Tonne) meant for next generation of GSLV *viz.* GSLV-MkIII launch vehicle is under advanced stage of development. Design and Development tests of sub-system elements of this new high-thrust cryogenic engine have been carried out successfully.

(b) Cryogenic engines are already in production in Indian industries. So far, eleven cryogenic engines for GSLV stel and two higher thrust cryogenic engines for GSLV Mk-III have been realized.

(c) In the Twelfth Five Year Plan, ₹ 192 crores has been allocated for realisation of cryogenic engines and stages, under GSLV programme.