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Season's Greetings  
and Best Wishes  
for a  
Happy New Year

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## CURRENT AFFAIRS

### Commercial space tourism moves closer to reality as Virgin Galactic gets FAA licence

Richard Branson's dream of commercial space tourism is a step closer to reality. His Virgin Galactic company has been granted an operating licence by US aviation officials to fly passengers to the point of weightlessness. The SpaceShipTwo vehicle can carry six passengers and two pilots. It is expected to debut sometime next year. The original SpaceShipTwo broke apart during a test flight in 2014 that killed the co-pilot and seriously injured the captain. Once final safety tests are completed on the new ship, space enthusiasts can rocket 100 kilometres above Earth for the trip of a lifetime. Hundreds of people have already paid a deposit for the trip which will cost about 220,000 euros.

Source: <http://www.euronews.com/>

### Self-flying ambulance test succeeds

An autonomous flying ambulance has successfully completed its first solo test flight, offering a potential solution for challenging search and rescue missions. Completing such missions in rough terrain or combat zones can be tricky, with helicopters currently offering the best transportation option in most cases. However, these vehicles need clear areas to land, and in the case of war zones, helicopters tend to attract enemy fire. The autonomous flying vehicle, dubbed the Cormorant, has been tested by an Israeli company and could one day go where helicopters can't. The vehicle is designed to eventually carry people or equipment without a human pilot on board, 'Live Science' reported. Rather than using propellers or rotors to fly, the Cormorant uses ducted fans that are effectively shielded rotors, which means the aircraft does not need to worry about bumping into a wall and damaging the rotors. Another set of fans propels the vehicle forward. The vehicle is effectively a decision-making system that can figure out what to do if there is a problem in the inputs from the sensors, the company, Urban Aeronautics, said.

Source: <http://health.economictimes.indiatimes.com/>

### India to train Vietnam's Sukhoi fighter pilots

In a further boost to its growing defence ties with Vietnam, India has agreed to train the southeast nation's Sukhoi-30 fighter pilots. The agreement was reached during bilateral discussions between Defence Minister Mr. Manohar Parrikar and his Vietnamese counterpart, General Ngo Xuan Lich. India and Vietnam have been steadily stepping up their cooperation, especially in the defence sector, against the backdrop of the growing assertiveness of China in the region. Bilateral ties recently received a further fillip when Prime Minister Narendra Modi visited Vietnam in September, on his way to the G-20 Summit in Guangzhou. Both India and Vietnam operate Russian Su-30 jets and the two countries' models differ slightly in their configuration. India already trains Vietnamese sailors in operating Kilo class submarines, which Hanoi had begun inducting since January 2014. India operates over 200 Su-30MKI fighters and nine Kilo-class diesel electric submarines. "Details are being worked out. Their pilots will be trained here. The two Air Forces will now sit and work out the numbers and scope. It should start fairly quickly," a defence source said. The cost of training is being worked out. However, it will not be paid through the \$500 million Line of Credit (LoC) extended by Delhi to Hanoi for defence procurements. "The terms and conditions of the LoC have been agreed upon. Vietnam has sought some concessions, to which we agreed. Some of it will be for modernisation of the existing equipment and the rest for new platforms," sources said. An agreement would soon be signed by Exim Bank, after which the projects would be identified.

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## MoU signed

A programme for cooperation between the Air Forces was also signed. A senior official said that it covered a cross-section of activities, including training of pilots and exchange of experts. "Vietnam is interested in our experiences in repair and maintenance," the official said. A memorandum of understanding was signed on peacekeeping as well as exchange of delegations. Mr. Parrikar offered "India's partnership as a reliable player in terms of transfer of technology and building a local defence industry". The two Ministers were learnt to have discussed the regional situation and taken note of their converging interests. Officials said Gen. Lich was positive on the progress made following Mr. Parrikar's visit to Hanoi in June. Underscoring the importance of the visit, the Minister is being accompanied by a 30-member delegation, the largest so far to have accompanied him on a foreign visit. It includes the chiefs of the Air Force and the Navy and the Deputy Chief of General Staff.

Source: <http://www.thehindu.com/>

## Japan launching 'space junk' collector

Japan launched a cargo ship bound for the International Space Station, carrying a 'space junk' collector that was made with the help of a fishnet company. The vessel, dubbed "Kounotori" (stork in Japanese), blasted off from the southern island of Tanegashima just before 10:27 pm local time (1327 GMT) attached to an H-IIB rocket. Scientists at the Japan Aerospace Exploration Agency (JAXA) are experimenting with a tether to pull junk out of orbit around Earth, clearing up tonnes of space clutter including cast-off equipment from old satellites and pieces of rocket. The launch was successful as "the satellite was removed from the rocket" and put into the planned orbit about 15 minutes after the liftoff, JAXA spokesman Mr. Nobuyoshi Fujimoto on Tanegashima told AFP. More than 50 years of human space exploration since the Soviet-launched Sputnik satellite in 1957 has produced this hazardous belt of orbiting debris. There are estimated to be more than 100 million pieces in orbit, posing a growing threat to future space exploration, scientists say. Researchers are using a so-called electrodynamic tether made from thin wires of stainless steel and aluminium. The idea is that one end of the strip will be attached to debris which can damage working equipment—there are hundreds of collisions every year. The electricity generated by the tether as it swings through the Earth's magnetic field is expected to have a slowing effect on the space junk, which should, scientists say, pull it into a lower and lower orbit. Eventually the detritus will enter the Earth's atmosphere, burning up harmlessly long before it has a chance to crash to the planet's surface. JAXA worked on the project with Japanese fishnet manufacturer Mr. Nitto Seimo to develop the cord, which has been about 10 years in the making. "The tether uses our fishnet plaiting technology, but it was really tough to intertwine the very thin materials," company engineer Mr. Katsuya Suzuki told AFP. "The length of the tether this time is 700 metre (2,300 feet), but eventually it's going to need to be 5,000 to 10,000 metre-long to slow down the targeted space junk," he added. Previous experiments using a tether have been done in recent years. Another spokesman for the space agency has said it hopes to put the junk collection system into more regular use by the middle of the next decade. "If we are successful in this trial, the next step will be another test attaching one tip of the tether to a targeted object," he added. The cargo ship launched is also carrying other materials for the ISS including batteries and drinking water for the astronauts living there.

Source: <http://phys.org/>

## Navy begins work to set INS Betwa upright

The Navy has begun the process of restoring guided missile frigate *INS Betwa* that tipped over while it was being undocked at the Naval Dockyard in Mumbai early this month. Two people were killed and 14 injured in the incident. Three international specialist firms are at present assisting the Navy in the preliminary work. "The task is to make the ship upright. As of now it is 25 per cent in water. Specialist teams are assessing as to how much of it is buoyant and how much is resting. All three firms are doing consultancy work. Final contract to one of them will be given in early

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January after which actual work will begin. All tasks will be undertaken by the Navy," a source said. The 4,000 tonne frigate was undergoing a scheduled two-year medium refit, which started on April 15. It is one of the three Brahmaputra class ships and was commissioned in 2004. The hull was being prepared for which the ship went into dry dock on October 20. The accident occurred when it was being undocked due to which the mast of the ship hit the ground on the left side.

## **Immediate objective**

Sources explained that the immediate task is to put blocks under it to prevent structural damage to the ship. After that controlled de-flooding of the dock as well as the ship will be undertaken and the ship would be made airtight. Once the ship is secured, Pneumatic Fenders, which are huge balloons, will be placed under the side and inflated to set the ship upright, officials said. "Work is going on 24x7 on war footing. It will take time," sources added.

Source: <http://www.thehindu.com/>

## **China plans to land probes on far side of moon, Mars by 2020**

CHINA vowed to speed up the development of its space industry as it set out its plans to become the first country to soft land a probe on the far side of the moon, by around 2018, and launch its first Mars probe by 2020. "To explore the vast cosmos, develop the space industry and build China into a space power is a dream we pursue unremittingly," according to a paper setting out the country's space strategy for the next five years. It said China aims to use space for peaceful purposes and to guarantee national security, and to carry out cutting-edge scientific research. The white paper, released by the information office of China's Cabinet, points to the growing ambitions of China's already rapidly advancing space program. China places great emphasis on the development of its space industry, seen as a symbol of national prestige that will raise the country's standing in the world. Although the white paper doesn't mention it, China's eventual goal is to land an astronaut on the moon. While Russia and the United States have more experience in manned space travel, China's military-backed program has made steady progress in a comparatively short time. Since China conducted its first crewed space mission in 2003, it has staged a spacewalk and landed a rover on the moon in 2013 — the first time humans had soft landed anything on the moon since the 1970s. Last month, two astronauts returned from a month-long stay aboard China's Tiangong 2 experimental space station, the country's sixth and longest crewed mission. A fully functioning, permanently crewed space station is on course to begin operations in six years and is slated to run for at least a decade. The white paper reiterated China's plans to launch its first Mars probe by 2020, saying it would explore and bring back samples from the red planet, explore the Jupiter system and "conduct research into major scientific questions such as the origin and evolution of the solar system, and search for extraterrestrial life." The paper said the Chang'e-4 lunar probe will help shed light on the formation and evolution of the moon. He Mr. Qisong, a space security expert at Shanghai University of Political Science and Law, said that achieving mankind's first soft landing on the far side of the moon is a newly stated goal. It indicates that China has mastered the underlying technology needed to land on a specific area of the lunar surface, he added. "China never talks big and says something it's unable to achieve," he said.

Source: <http://www.news.com.au/>

## **Solar Impulse founder sees electric passenger plane in 10 years**

The co-founder of a project that saw a solar-powered aircraft complete the first fuel-free flight around the world this year expects electric passenger planes to operate in just under 10 years. Bertrand Piccard, who along with fellow pilot Mr. Andre Borschberg founded Solar Impulse, also shrugged off concerns that U.S. President-elect Donald Trump's appointment of a fossil fuel industry defender as his top environmental official could hamper global clean technology efforts. Since completing their historic fuel-free flight in July, Mr. Piccard and Mr. Borschberg have been working on

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projects to show how the technologies used in their plane can be used in other applications. Mr. Borschberg said they were especially interested in how the technology could be used to develop small electric planes with a flying time of about 1.5 hours. The two plan to announce their next project early next year, Mr. Borschberg said. "In 9 years and 8 months, you'll have 50 people traveling short-haul on electric planes," Mr. Piccard, founder and chairman of Solar Impulse told an IATA airlines association briefing in Geneva. "Why 9 years and eight months? Because since four months, I've been saying it will be '10 years'. It will happen," he added. Mr. Piccard said that it didn't matter what people thought about climate change because clean technology was getting cheaper and would help to drive growth. He cited examples of insulation making homes cheaper to live in, of LED lights reducing lighting costs. "Five years ago everything that was clean tech was more expensive - that is not the case today. If the aim is to be profitable and create jobs, then coal is out of business," he said.

Source: <http://uk.reuters.com/>

## **Aircraft carrying organs to now get top priority**

Aircraft carrying human cadaveric organs for transplant will be allowed to take off and land on a priority basis, according to the first set of standard operating procedures (SOPs) drafted by the Bureau of Civil Aviation Security (BCAS) to facilitate quick transportation of organs. It also states that organs could be exempted from X-ray screening to avoid radiation exposure. Stakeholders are upset that there is no mention of capping the airfares, that is often arbitrary, exorbitant, and currently the biggest hurdle in organ sharing within cities and between states. The SOPs prepared by the aviation ministry in collaboration with the National Organ and Tissue Transplant Organization (NOTTO) is the first attempt to standardise practices for transportation of human organs by air across the country. The SOPs outline the procedures in relation to the labelling, packaging and storage of organs, necessary to maximise safety of travellers and avoid any risks to the organ. Among other pertinent points, the norms also delve into designing a see-through package that will make it easier for the airport security personnel to check the container without opening it. Airlines have been entrusted with clear responsibilities to avoid any delay once the organ has reached the airport. The SOPs are supposed to be implemented with immediate effect. The norms were conveyed to the managing directors of all major domestic airports, security officers and representatives of the private airlines in a meeting held on November 25 by the Civil Aviation ministry. Additional deputy director general Dr Anil Kumar said that the NOTTO had written to several ministries to aid in organ transportation. "BCAS was the first one to respond and formulate the guidelines. The idea is to have standard practices for the country rather than following general international guidelines. Priority take off and landing alone can save more than 20-25 precious minutes," he said.

Source: <http://timesofindia.indiatimes.com/>

## **IAF to get one more C-17 aircraft**

The Indian Air Force (IAF) will procure one C-17 Globemaster III heavy-lift transport aircraft to add to the existing fleet of 10. This was one of the four proposals cleared by the Defence Acquisition Council (DAC). The other three proposals, worth Rs. 7,184 crore, include protection systems for infantry vehicles, 3-Dimensional air defence radars and maritime surveillance aircraft for the Coast Guard. The DAC, chaired by Defence Minister Mr. Manohar Parrikar, reviewed the current state of capital acquisitions and granted the Acceptance of Necessity (AoN) to the four proposals, Defence Ministry officials said. AoN is the first stage of approval in the procurement process. In 2011, India purchased 10 C-17s from the U.S. through the Foreign Military Sales (FMS) route in a deal worth \$4.1 billion which had a follow-on clause for six more aircraft. Since induction, the C-17s have become the symbol of India's rapid airlift capability in responding to contingencies across the neighbourhood. Boeing began shutting down the assembly line due to lack of further orders. In fact, 10 additional aircraft were manufactured and offered to all existing customers. A warning was sounded to India for an immediate decision. However, a delay in decision making in the Defence Ministry meant that the IAF missed out on the opportunity. Of the 10, nine have been picked by existing users of the aircraft and one remains with

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Boeing. A separate deal will now have to be negotiated with the U.S government due to which officials said the price is yet to be determined. Bharat Electronics Limited (BEL) will supply 1,500 Nuclear, Biological and Chemical (NBC) protection systems for the Army's Infantry Combat Vehicles (ICV) in a deal worth Rs. 1,265 crore. Army sources said these were modern automated systems and would replace the existing manual ones in use. The Army and Air Force will get 55 low-level light-weight radars for their air defence regiments to replace the 2D radars in use. These 3D radars are indigenously designed by the Defence Research and Development Organisation (DRDO). The Coast Guard has been given the go-ahead to procure six multi-mission maritime aircraft and the suites for them will be designed by DRDO. The deal is expected to cost around Rs. 5,500 crore. The much expected policy guidelines on strategic partnerships was, however, not on the agenda.

Source: <http://www.thehindu.com/>

## **Agni-V test-fired again from mobile-launcher**

The test-firing of India's most formidable ballistic missile, Agni-V, from the Dr. Abdul Kalam Island, off the Odisha coast, was an unalloyed success, signalling that India's nuclear deterrence capability has come of age. This is the fourth success in a row for Agni-V, which can carry a nuclear warhead weighing about 1.5 tonnes over a distance of 5,000 km and plus. "There were no issues at all in the flight," officials of the Defence Research and Development Organisation (DRDO) said. Agni-V is a product of the DRDO. It was the second time that Agni-V was fired from a canister mounted on a massive TATRA truck parked on the Island. A gas generator at the bottom of the canister kicked out the long-range, three-stage, surface-to-surface missile that weighed 50 tonnes, was 17 metres long and had a two-metre diameter. The previous Agni-V flight from a canister was on January 31, 2015. A missile launched from a canister mounted on a road-mobile launcher gives it operational flexibility. This means it can be fired from a road in a city, after stopping the traffic, giving reduced reaction time. The missile can be made vertical in three minutes and the launch takes a few more minutes. After the lift-off, the truck can speed away. Mr. G. Satheesh Reddy, Director General (Missiles and Strategic Systems), DRDO, said, "Today's Agni-V flight met all the mission objectives and proved many indigenous technologies and capabilities." The lift-off took place around 11 a.m. As Agni-V vaulted out of the confines of the canister, it rose to a height of 20 metres. Then the first stage motor kicked in and the missile soared to an altitude of 600 km and struck a parabolic path. The two stages jettisoned and the missile accelerated as it plunged towards the earth. Its re-entry systems worked perfectly. The heat-shield made of carbon-carbon composites and encasing the dummy warhead, withstood a temperature of about 4,000 degrees Celsius. The on-board computer guided the missile towards its impact point in the Indian Ocean. After a 20-minute flight, it fell near the Australian waters. The bouquet of five Agnis form the bulwark of India's nuclear deterrence capability. While Agni-I has a range of 700 km, Agni-II 2,000 km, and Agni-III 3,000 km, Agni-IV can take out targets 4,000 km away.

Source: <http://www.thehindu.com/>

## **China tests prototype of fifth-generation fighter jet**

China has tested the latest version of its fifth-generation stealth fighter, state media reported, as it tries to end the West's monopoly on the world's most advanced warplanes. The test comes as the nation flexes its military muscles, sending its sole aircraft carrier the Liaoning into the western Pacific in recent days to lead drills there for the first time. The newest version of the J-31 — now renamed the FC-31 Gyrfalcon — took to the air for the first time, the China Daily reported. Better stealth capabilities The so-called "fifth-generation" twin-engine jet is China's answer to the U.S. F-35, the world's most technically advanced fighter. The new FC-31 has "better stealth capabilities, improved electronic equipment and a larger payload capacity" than the previous version which debuted in October 2012, the newspaper said, quoting aviation expert Mr. Wu Peixin. "Changes were made to the airframe, wings and vertical tails which make it leaner, lighter and more manoeuvrable," Mr. Wu told the paper. The jet is manufactured by Shenyang Aircraft Corp.,

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a subsidiary of the Aviation Industry Corp of China (AVIC). The fighter is expected to sell for around \$70 million, the article said, aiming to take market share away from more expensive fourth-generation fighters like the Eurofighter Typhoon. AVIC has said that the FC-31 will “put an end to some nations’ monopolies on the fifth-generation fighter jet”, the China Daily reported. Weapons industry China is aggressively moving to develop its domestic weapons industry, from drones and anti-aircraft systems to home-grown jet engines. In the past it has been accused of copying designs from Russian fighters, and some analysts say the FC-31 bears a close resemblance to the F-35. When completed, the FC-31 will become the country’s second fifth-generation fighter after the J-20, which put on its first public performance at the Zhuhai Air Show in November. — AFP

Source: <http://www.thehindu.com/>

## **Three air ambulances take off to cater to the critically ill**

In case of a medical emergency, the golden hour is crucial, for it spans the moments between life and death. A fleet of three medically configured helicopters was launched to offer a smooth ride to patients in need of immediate medical care. Each helicopter can accommodate two pilots, three paramedics, one stretcher and advanced life support medical equipment. The [air ambulance](#) service, promoted by Bengaluru-based Aviators Air Rescue Ltd., was flagged off by chief minister Mr. Siddaramaiah. The company aims to cover Karnataka, Tamil Nadu, Kerala, Andhra Pradesh and Telangana through this service, which will be offered through state governments, rescue groups, hospitals, clinics, public and private companies and to individuals who opt for subscriptions. It’ll operate a fleet of brand new Airbus Helicopters H130 rotorcraft. What’s an air ambulance An air ambulance airlifts patients to and from healthcare facilities and the injured from accident spots. The service covers pre-hospital and emergency care to patients during aero-medical evacuation or rescue operations aboard helicopter When it’s required Air ambulance is required in case of medical emergency, when a patient needs medical attention and immediate transportation from a particular place to a hospital Service includes The service covers even ground transport, if necessary. Normally, the chopper is equipped to evacuate a patient or injured person from the very spot of the incident About the company Aviators Air Rescue Ltd. is a Bengaluru-based company which specializes in aero-medical evacuation. It has three medically configured Airbus Helicopters H130 rotorcraft. “We want to deliver a world-class air ambulance service that’s affordable and accessible to all,” said Mr. Arun Sharma, MD, Aviators Air Rescue Emergency contact number: 155350 Cost factor Annual subscription: Rs 18,000 per annum for a family of four

Source: <http://timesofindia.indiatimes.com/>

## **TECHNOLOGY**

### **Drawing TeamIndus To Launch India’s First Private Mission To The Moon Using ISRO’s PSLV Rocket**

Indians are going places, and this time, it’s the moon. TeamIndus, a space technology company said it has signed a verified commercial launch contract with the Indian Space Research Organisation (ISRO) to land a spacecraft on the moon as part of its bid to win the Google Lunar XPRIZE. It’s also the only Indian organisation competing for the Google Lunar XPRIZE, a \$30-million reward that requires privately funded teams to land their spacecraft on the surface of the moon, travel 500 metres, and broadcast high-definition video, images, and data back to earth. The company has been working on the project since 2011 and said that it will launch its moon-bound spacecraft aboard the Polar spacecraft aboard the Pola Satellite Launch Vehicle (PSLV), on December 17. Mr. Rahul Narayan, TeamIndus’ fleet commander, further expressed that this will help India to join an exclusive club of nations with proven technology to soft-land on the moon, thereby opening newer avenues of space exploration. “If you treat space as the new frontier, then who better than the next generation of people who bring in new innovative approaches. We want to see there is enough capacity to make use of the knowledge in India for the world market,” said AS Kiran Kumar, chairman, ISRO. TeamIndus has the most impressive bunch of

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investors; Mr. Ratan Tata, Mr. Nandan Nilekani, Mr. Sachin Bansal and Mr. Binny Bansal, Mr. Rajiv Mody of Sasken Communications, Mr. Jagdish Mehta of CTS India, Mr. Venu Srinivasan of TVS Group, Mr. Anand Deshpande of Persistent Systems and stock market investors Mr. Rakesh investors Mr. Rakesh Jhunjhunwala, Mr. Ashish Kacholia, Mr. RK Damani among others. In a launch window starting on December 28, 2017, the PSLV will inject the spacecraft into an orbit 880 km x 70,000 km around the earth. The Spacecraft will then undertake a 21-day journey to soft land in Mare Imbrium, a region in the north-western hemisphere of the moon.

Source: <http://www.indiatimes.com/>

## Israel turns to ISRO for space technology

It's not just India that seeks technologies from Israel. This time, it's Israel that's come knocking on the doors of Indian Space Research Organisation (ISRO) for collaborations in key technologies. Mr. Avi Blasberger, director, Israel Space Agency (ISA) told TOI after a meeting with the space agency: "We have specific areas in which we'd like to collaborate with ISRO. I'm hopeful that something serious will emerge after more meetings." Mr. Blasberger said that Israel was particularly keen on collaborating in technologies relating to earth observation, communication and rocket propulsion. "We are also looking at radar satellite," he added. ISRO is already working on a dual synthetic aperture radar project in collaboration with Nasa, which TOI was the first to report about. While stating that Israel is not looking at any collaboration in India's big-ticket projects to the Sun (Aditya) or the second mission to Mars, Mr. Blasberger said: "ISRO is among the best geo-stationary orbit technology and is a leader in several other areas; there'll be a lot to learn and exchange." Sources in ISRO said that while Mr. Blasberger met some officials in person, he could only communicate with the agency's chairman Mr. AS Kiran Kumar via a video call. "The talks are on and at are a very nascent stage now," confirmed an ISRO official. Mr. Blasberger said he'll be visiting the ISRO Space Centre (ISAC) along with Mr. Offir Akunis, Israel's science, technology and space minister. India has signed collaboration agreements with Israel in several fields, including defence technologies. However, this is the one of the first times that Israeli officials are visiting India looking to forge ties in the field of technology. "They (Israel) have already launched some of their satellites with us, which was pure business. However, collaborations that are being proposed now show that ISRO can also play the role of a guide," added another source.

Source: <http://timesofindia.indiatimes.com/>

## PSLV-C36 Successfully Launches RESOURCESAT-2A Remote Sensing Satellite

In its thirty eighth flight (PSLV-C36), ISRO's Polar Satellite Launch Vehicle successfully launched the 1235 kg RESOURCESAT-2A Satellite today morning (December 07, 2016) from Mr. Satish Dhawan Space Centre SHAR, Sriharikota. This is the thirty seventh consecutively successful mission of PSLV. After PSLV-C36 lift-off at 10:25 am IST from the First Launch Pad with the ignition of the first stage, the subsequent important flight events, namely, strap-on ignitions and separations, first stage separation, second stage ignition, payload fairing separation, second stage separation, third stage ignition and separation, fourth stage ignition and cut-off, took place as planned. After a flight of 17 minutes 05 seconds, the vehicle achieved a polar Sun Synchronous Orbit of 824 km height inclined at an angle of 98.725 degree to the equator (very close to the intended orbit) and 47 seconds later, RESOURCESAT-2A was separated from the PSLV fourth stage. After separation, the two solar arrays of RESOURCESAT-2A deployed automatically and ISRO's Telemetry, Tracking and Command Network (ISTRAC) at Bangalore took over the control of the satellite. In the coming days, the satellite will be brought to its final operational configuration following which it will begin to provide imagery from its three cameras. The data sent by RESOURCESAT-2A will be useful for agricultural applications like crop area and crop production estimation, drought monitoring, soil mapping, cropping system analysis and farm advisories generation. Like its predecessors RESOURCESAT-1 and 2, RESOURCESAT-2A has a unique 3-Tier imaging system with Advanced Wide Field Sensor (AWiFS), Linear Imaging Self Scanner-3 (LISS-3) and Linear Imaging Self Scanner-4 (LISS-4) cameras. The AWiFS provides images with a sampling of 56 metres, a swath of 740 km and a revisit of 5 days whereas the LISS-3 provides 23.5 metre sampled images with 141 km swath and a repetitivity

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of 24 days. LISS-4 provides 5.8 metre sampled images with 70 km swath and a revisit of 5 days. With today's launch, the PSLV has yet again demonstrated its reliability. The total number of satellites launched by India's workhorse launch vehicle PSLV including today's RESOURCESAT-2A has now reached 122, of which 43 are Indian and the remaining 79 are from abroad.

Source: <http://www.ISRO.gov.in/>

## **GSLV-Mk3 to fly on Jan. 20**

GSLV-Mark 3, the country's most powerful launch vehicle built to lift the heaviest Indian communications satellites to space, is set for its first full-fledged flight on January 20, two ISRO directors announced. Mk III can loft satellites weighing 4,000 kg to space, double the weight the current GSLV-Mk II can lift. "We are working to have the maiden test of GSLV-Mk3 flight on January 20," said Mr. S. Sivan of the Vikram Sarabhai Space Centre after the launch of Resourcesat-2A at Sriharikota. The vehicle will put the GSAT-19E communication satellite into orbit. when functional in a few years, Mk III will also enable ISRO to launch from India communications spacecraft to geostationary orbits of 36,000 km. Because of the absence of a powerful launcher, ISRO currently launches satellites above 2,000 kg on European rockets for a big fee. Mk III was partially tested in a 150-km 'sub-orbital' flight in December 2014, without the cryo engine. The smaller and now operational GSLV-Mk II will have its second flight soon. It will put GSAT-9 communications satellite into orbit.

Source: <http://www.thehindu.com/>

## **Solar and wind power can alleviate India's energy shortage**

The renewable sources of energy, which is gaining massive popularity in Europe, is hardly developed in India contributing only 11 per cent of the total production. The country is still heavily dependent on the polluting thermal source which meets more than half of its requirement, with hydroelectric contributing 22 per cent, natural gas 10.30 per cent and nuclear energy a mere 2.7 per cent. Transmission and distribution losses — most of which happens due to theft — are extremely high at 24.7 per cent in 2010-11; there is a peak power shortfall of 13 per cent. India has 50,000 or more villages which cannot be connected through grids because of their small population, difficulty of terrain and remoteness. Power shortages are constraining growth, while there is shortage of coal, and imported coal is expensive. The conventional methods of producing electric power have two major drawbacks — environmental pollution resulting in global warming and drainage of foreign exchange resources. India has about 300 sunny days amounting to about 3,000 hours of sunshine equivalent to 5,000 trillion kwh. Solar energy is generated during daylight hours which is the period of normal peak demand. It is pollution free and inexhaustible in a tropical country like India. It can be used through the thermal route for heating, cooking etc or by generation of electricity through photovoltaic cells. Electricity generated through photovoltaic cells and CSP plants can be connected to the grid. Solar energy conversion equipment have a longer life, less maintenance costs and lower running costs than equipment producing power through conventional sources. Solar photovoltaic cells convert solar radiation into electricity; high temperature solar energy collectors use concentrated solar radiation to generate electricity through the thermal route. In rural India where grid power is not available, cheap solar technology is a viable alternative; the electricity infrastructure could consist of a net work of local-grid clusters with distributed solar electric generation bringing cheap power to the masses. In July 2009, India announced a plan to produce 20 GW of solar power by 2020. Under the plan solar powered equipment and applications are to be made compulsory in all government buildings, hospitals etc. In November 2009 the National Solar Mission was launched with a plan to generate 1,000 MW by 2013. The ministry of new and renewable energy resources (MNRE) has installed solar radiation resource assessment stations across India to create a Solar Atlas.

## **Encouraging solar companies**

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The 2010-11 budget provided funds to the Jawaharlal National Solar Mission and established a clean energy fund. It sought to encourage private solar companies by reducing the customs duty on solar panels by 50 per cent and exempting excise duty on solar photovoltaic cells; it also levied a coal tax on domestic and imported coal used for power generation to discourage coal consumption. MNRE provides a 30 per cent subsidy on installation costs of a solar electric power plant; its strategic plan for 2011-17 is to produce 2,1700 MW of power from renewable resources over a 6 year period, including 4,000 MW of solar power and 13,400 MW of wind power, for which the funds required for grid-connected power from renewable sources is estimated at Rs 12,900 crore including Rs 8,368 crore for solar and Rs 2,800 crore for wind power. This April, Gujarat set up a 600 MW solar power generation capacity solar park at Charanka in addition to the 214 MW plant set up earlier. The chief minister said that the cost of solar power has come down from Rs 15 per unit to 8.50 per unit after the state chalked out plans to tap solar energy. In Rajasthan an area of 35,000 sq.km has been set aside in the Thar desert for solar power projects sufficient to generate 700 GW to 2,100 GW of solar power (which would involve massive investment). Bangalore has the largest deployment of rooftop solar water heaters in India which generate 200 MW of power every day. Karnataka State allows a rebate of Rs 50 per month on electric bills for residents using roof top thermal systems and they have been mandatory for new structures; the state is setting up solar panels along 10,000 km of canals to provide power for agricultural purposes and lighting; each village on the banks is expected to generate 5 MW of power for its use. The installed capacity of solar power in India which was a mere 20 MW in 2010-11, shot up to 940 MW the next year. Investment in solar power projects in 2011 crossed \$ 2 billion. Solar power plants need only a one-time investment in land and PV panels, and their fuel is free unlike coal whose cost goes on increasing. If the duration of the power purchasing agreement which is 25 years is taken into account, the cost of producing solar power becomes competitive as compared to power from coal, wind and hydroelectric plants. Considerable progress in harnessing solar energy has been achieved in the last three years due to subsidies and encouragement provided by the Central and state governments and the enterprise of the private sector. Given the chronic power shortages in India, maximising the generation of electricity from solar and wind sources appears to be the most viable option; however, this calls for increased investment in research and development in those areas, to bring down the rates of power from those sources at least to the level of the rates from conventional sources.

Source: <http://www.deccanherald.com/>

## **Turbines may boost crop growth**

Wind turbines in farms not only capture renewable energy, but may also help crops grow more efficiently, a new study has found. Tall wind turbines disbursed throughout a field create air turbulence that may help plants by affecting variables such as temperature and carbon dioxide concentrations, said Professor Gene Takle of Iowa State University in the US. Scientists installed research towers on a 200-turbine wind farm. The research towers collected data from 2010 to 2013 on wind speeds and directions, temperature, humidity, turbulence, gas content and precipitation. The project aimed to discover how the turbulence created when wind moves through the turbines affects conditions at ground level where crops grow. The data show that the wind turbines have a measurable impact on several key variables that affect growing conditions.

Source: <http://www.thehindubusinessline.com/>

## **ISRO to launch record 83 satellites in one go in Jan**

ISRO today said it would launch a record 83 satellites in one go using its workhorse PSLV-C37 toward the end of January. "We are working for a January launch. It will be toward the end of January. The date has to be fixed," Indian Space Research Organisation Chairman Mr. A S Kiran Kumar told reporters here. Of the 83 satellites, 80 belong to Israel, Kazakhstan, Netherlands, Switzerland and the US. They weigh about 500 kg. The three Indian satellites are Cartosat-2 series, weighing 730 kg as primary payload, and INS-IA and INS-1B, weighing 30 kg. Setting a record in its

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space programme, ISRO in June had successfully launched 20 satellites, including its earth observation Cartosat-2 series, in a single mission on board PSLV-C34 from the spaceport in Sriharikota in Andhra Pradesh. The space agency had earlier sent 10 satellites into orbit on a single mission in 2008. Calling 2016 a “good” year, Mr. Kumar said ISRO would launch at least five communication satellites in 2017. “It (launches) will be more next year, we are actually looking at almost something like five communication satellites, then many more others. Some earth observation also,” he said in response to a question on the number of launches that can be expected in 2017. “In the year we are primarily trying to do our GSLV Mark III, then Mark II... one more launch we are trying to do,” Mr. Kumar said. The first three months should see three launches, beyond which ISRO was targeting almost one a month, he said on the sidelines of the 21st convocation of the National Institute of Mental Health and Neuro Sciences (NIMHANS) here. Stating that 2016 was a good year because ISRO was able to improve on what they were doing the previous year, Mr. Kumar said the main emphasis now was on building capacity. “We need more and more capacity, launch capacity. We are working toward that. Our effort is to continuously increase,” he added. On transponder augmentation that ISRO is looking for, he said, “GSAT-17 is having another 48 transponders, then there is a SAARC satellite which will have about 12 transponders, then we are getting into the next generation GSAT-11 and GSAT-19. We are trying to do something like 14 gigabyte and 90 gigabyte type of thing- multi beam satellites.” Noting that ISRO is conducting tests for hazard avoidance for Chandrayaan 2 as it lands, he said, “We are verifying the performance of the system as designed.” “Chandrayaan 2, we are preparing for hazard avoidance, as it lands then it has to avoid boulders and things. We are verifying the performance of the system as designed, so there are some craters created and as it comes down how it negotiates. We are evaluating the performance of the system,” he added. ISRO has been conducting these tests at its facility in Challakere in Chitradurga district of Karnataka.

Source: <http://timesofindia.indiatimes.com/>

## **U.S. arms technologies come closer**

With Major Defence Partner status, India will be offered simplified licensing requirements With U.S. designating India as a Major Defence Partner (MDP), licensing regulations to acquire sensitive military technologies, such as those that go into the F-16 and F-18 fighter jets, will be simplified. An official said that the designation “institutionalises” the cooperation achieved so far between the two countries. This is a unique designation conferred on India, outside the North Atlantic Treaty Organisation (NATO) countries and U.S. treaty allies such as Australia and Japan.

### **Legal framework**

Earlier this week, the U.S. Congress passed the National Defence Authorisation Act to enhance defence and security cooperation with India. Defence Minister Manohar Parrikar and U.S. Defence Secretary Ashton Carter agreed on the provisions of the designation in New Delhi. President Barack Obama has to sign the Bill into a law. This comes at a time when India is considering proposals for a new fighter aircraft to be built under the “Make in India” initiative, in significant numbers, with technology transfer. U.S. aerospace majors Boeing and Lockheed have submitted proposals to build their F-18 and F-16 fighter jets. Saab of Sweden has done so for Gripen. “The MDP eases [the process of licensing for military and dual-use items. It streamlines the process and reduces India’s licensing requirements,” another official said. A senior official of the Pentagon, with experience in defence acquisition and technology, will be designated to expedite matters for India. However, the status will not help circumvent multilateral control regimes. Officials said the designation was envisaged as a way to bring India on the same level as the U.S. treaty allies, in the absence of a formal treaty between the two countries. Officials have expressed confidence that the progress achieved under initiatives such as the Defence Technology Trade Initiative (DTTI) and the India Rapid Reaction Cell (IRRC) in the Pentagon would continue in the next U.S. administration as it is now enshrined in the U.S. law. India and the U.S. are expected to announce a major new project under the DTTI. An official said it would be announced by year-end.

Source: <http://www.thehindu.com/>

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## India will soon switch over to 4-digit flight numbers

In a bid to enhance safe flying and end the confusion caused by similar sounding call signs or flight numbers, India will soon switch over to longer flight numbers. Instead of the current three-digit flights numbers, the country will transition to longer four-digit ones. The Directorate General of Civil Aviation (DGCA) is working on this switch over as India has witnessed an exponential growth in air traffic in past few years and is the world's fastest growing aviation market. The existing three-digit numbers are increasingly leading to confusion and there has been a spate of safety scares when similar sounding flight numbers operate to or from the same airport around the same time — something which happens very frequently due to the volume of traffic now. For instance, the regular approved a schedule of 16,600 weekly domestic flights in the ongoing winters, up 21% from last winter's figure of 13,744. The four-digit flight numbers will simply mean more available flight numbers and removing the possibility of similar sounding flights operating to or from the same airport close to each other. "This is a very important project. We have had a few meetings on this issue and hope to crystallise this in the next week or so. A number of other countries have moved to four digit flight numbers and we will also do so shortly given the rise in air traffic here," said a senior DGCA official.

Source: <http://timesofindia.indiatimes.com/>

## BUSINESS

### Army to receive first Howitzer by June

After a wait of three decades, the Indian Army is set to receive its first Howitzer by June 2017, thanks to a \$737-million deal with the US. The government-to-government contract between Washington and New Delhi will facilitate the sale of BAE Systems' M777 ultra-lightweight Howitzers to the army, which didn't have any artillery since the purchase of the Bofors guns. A week before US Secretary of Defence Ashton Carter's India visit on December 8, the Defence Ministry had signed the Letter of Acceptance to purchase 145 M777 guns through the foreign military sales route. The countdown to the delivery has already begun as BAE Systems is to supply the first one within six months, sources said. The entire consignment is to be delivered over a period of about 54 months. While the first 25 guns are to be imported in two years, the rest would be assembled at a factory at Faridabad, which Mahindra set up in partnership with BAE Systems. At half the weight of other 155mm-towed Howitzers, the M777 provides a rapid reaction capability, and is the only battle-proven 155mm ultra-lightweight Howitzer in the world. For the Indian Army, the guns would be useful while serving on mountainous terrain. Also, since they can be carried by Chinook helicopters, which also India is buying from the US, they can be quickly moved to areas close to the border. Almost a decade ago, the army had proposed purchasing the 155 mm/39 calibre lightweight Howitzers. But even after the ministry approved the M777 purchase and the gun performed well in the trials, the deal was stuck due to price negotiation.

Source: <http://www.deccanherald.com/>

### NRIs offer to build Kerala's green airport

Global Indian Association has shortlisted five sites and submitted a report to Mr. Pinarayi Vijayan. Five sites have been shortlisted in Pathanamthitta and Kottayam districts for a Rs.2,500-crore greenfield international airport to be developed by a joint venture of Non-Resident Indians. Close on the heels of abandoning the controversial airport project at Aranmula in Pathanamthitta district, the New-Delhi-based Global Indian Association (GIA), a non-political organisation working for the welfare of NRIs, has approached the State government seeking in-principle approval for the aeropolis. The GIA has floated a company, Indo-Heritage International Aeropolis Pvt. Ltd., for executing the project and opened its office in Pathanamthitta. The site selection report of the AECOM, global provider of technical and support services to airport owners, investors and aviation clients, has been submitted to Chief Minister Mr. Pinarayi Vijayan. The U.S.-based AECOM is the technical consultant for Kannur International Airport. Kootickal (10 km from Konni), Cheruvally estate (2.5 km from Theni-Kottarakara highway and close to Erumeli town), Laha estate, Malayalapurzha-Kumbzha estate (three km from Pathanamthitta Central Junction) and Kalleli are the sites identified after studies. Of the five

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sites, the AECOM has concluded that the Cheruvelli estate is the “most preferred location” and the Laha estate comes next. Situated on way to Sabarimala and 136 km from the State capital, the site consists of about 2,268 acres of vast stretches of plain land. No man-made obstacles “The vegetation comprises a large number of rubber plants and no man-made obstacles were observed at the site and its vicinity,” the AECOM said. The highest elevation of the site is 220 m and lowest 60 m. The AECOM has found that the Laha estate has severe undulating topographical features. In the case of the Kumbuzha estate, it has been found that hills surrounding the site are a hazard for landing and take-off of aircraft. Similar problems prevail in the Kalleli estate. The problems in the Laha estate can be sorted by repositioning the runway. Mr. Rajeev Joseph, international president of the GIA, in a letter to the Chief Minister, said “they are very particular in protecting and promoting the ecology, culture, heritage, and social system.” The GIA said it had commenced discussions with all political leaders and all sections of people in Pathanamthitta and Kottayam districts to seek their cooperation. The government has been asked to take a decision on the sites recommended to enable the AECOM to carry out the next phase of the prefeasibility study. The GIA also expressed its readiness to mobilise the Rs.2,500 crore needed for the airport if the government made available the land. In case there are hitches, the GIA said the company floated by it was ready to procure land and take up construction of the greenfield airport.

Source: <http://www.thehindu.com/>

## **Bengaluru to be Jet Airways’ third hub in India**

India’s largest private full-service carrier Jet Airways has expressed its vision to make Bengaluru its third hub in the country, after Mumbai and Delhi, in a bid to make the most of the burgeoning opportunities here. While the airline has not yet announced the exact timeline for this development, it has reposed more faith in the Bengaluru airline market. “Bengaluru’s rise as a prominent global investment destination, apart from its large young (working) population, has resulted in significant growth in aviation traffic — inbound and outbound — both domestic and international. Today, the city houses India’s third busiest airport, which hopefully, will rise to at least the second position in future,” Jet Airways Vice President (Commercial — India Sales) Mr. Praveen Iyer told DH, adding that with this view, the airline intends to make its presence felt here, and to turn it into a hub sometime in the months to come. Airline hubs or hub airports are used by an airline to concentrate passenger traffic and flight operations at that given airport, which in turn, serves as transfer (or stop-over) points to get passengers to their final destination. “The ratio of traffic to population in Bengaluru stands at a robust 1.6 (Bengaluru has a population of 12 million, recording annual air traffic of 19 million), and this is continuously growing,” he said. The Bengaluru market, which is growing at 30% year-on-year, has the ability to take on more departures, considering that the other metros are largely saturated. Also, it provides a gateway to regional points, apart from links to metros and tier-II cities. “We connect to 45 destination from Bengaluru, with 53 domestic flights a day. Until now, we had one international destination from Bengaluru (Abu Dhabi). From, we’ll be launching our Bengaluru-Singapore service, while a Bengaluru-Colombo flight will commence from January 5,” Mr. Iyer said. Jet Airways carried two million passengers out of Bengaluru in 2015-16. It achieved 20% average annual growth rate, based on passenger numbers. While the airline operates its Boeing 737 and ATR fleet out of Bengaluru, come January 15, it will fly an Airbus A330 on the busy Bengaluru-Mumbai sector.

Source: <http://www.deccanherald.com/>

## **Airlines want direct line to passengers**

Domestic airlines have approached the Centre to enable them to communicate directly with passengers in case of rescheduling of flights, especially during the fog season, citing difficulties in informing those who book their tickets through travel agents about flight delays and other critical information. “Every morning, we wake up to fog in Delhi and I see irate customers on the social media asking us why they weren’t informed about the flight delay,” Vistara chief strategy and commercial officer Mr. Sanjiv Kapoor said at the inaugural of the two-day India Aviation ICT Forum 2016, organised by global air transport IT provider SITA here. “Now, 98 per cent of our customers may carry smartphones but we only have contact information of those who either book through us or are frequent flyer members. We don’t have

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contact information of 50 per cent of passengers who book through travel agents,” he said. On the sidelines, Mr. Kapoor said that roughly 75 per cent of all airline tickets are booked through travel agents at present. “Any technology solution that can integrate passenger information with our database in addition to regulatory solution would be a game-changer and make travel hassle-free for customers,” he said. An airline executive said most travel agents do not share contact information of passengers fearing airlines may take away their customer base. Another airline executive said that it has approached the government to frame regulations to make it mandatory for travel portals to pass on passengers’ contact information to airlines. “In nine out of 10 complaints, we find that travel agents haven’t shared the contact details of passengers with us,” said SpiceJet senior vice-president and head of in-flight services Mr. Kamal Hingorani. “We have requested the government to make Aadhaar or any other single identification mandatory for flight bookings so that the contact details of passengers are captured,” Mr. Hingorani said at the sidelines of the event. Airline IT report Domestic airlines and airports are expected to ramp up their spending towards technology in 2017, according to SITA’s 2016 IT Trends Benchmark study released here. Around 80 per cent of the airports are expecting an IT budget increase in 2017 over 2016 compared to 58 per cent airports globally, the report said. Over the next three years, 80 per cent of airlines and 67 per cent of airports plan major projects developing mobile services for passengers, the report added. Further, around 83 per cent of airports plan major passenger self-service initiatives in the next three years.

Source: <http://www.thehindu.com/>

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