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## 1. JEEVAN - Low Cost Ventilator

### Context:

- The Indian Railways has developed a low-cost ventilator, Jeevan, at its Kapurthala Rail Coach Factory. These ventilators could save thousands of lives at a time the country is grappling with a shortage of the medical equipment in its fight against Coronavirus.

### Highlights: Ventilator and COVID-19:

- A ventilator is a device used to pump air and oxygen into the lungs, and it can be critical for a patient with severe COVID-19 infection which can lead to lung failure.
- India might need anywhere between 110,000-220,000 ventilators by May 15 in the worst-case scenario.
- The number of ventilators today available in the country is a maximum of 57,000 and come with a cost of Rs 5-Rs 15 lakh, according to a Brookings report.
- According to the Health Ministry, the number of confirmed novel coronavirus cases in the country climbed to 3,374 on Sunday while the death toll rose to 79.
- Of them, the number of active COVID-19 cases stood at 3,030.

### JEEVAN Ventilators:

- The heart of the device is the compressed air container to work the Ambu bag with air without any moving parts like servo motor or piston or link mechanism.
- It has a microprocessor-based controller and the circuit has been designed by the RCF team.
- A valve has been installed to regulate breathing of the patient and the device can be optimized to a more compact size.
- The machine provides control on breathing rate, expiratory ratio, and tidal volume - all key parameters for any ventilator and has a microprocessor-based controlling system.

## 2. Bacillus Calmette-Guerin (BCG) vaccination

### Context:

- Recently, Bacillus Calmette-Guerin (BCG) vaccination a “game-changer” in the fight against novel coronavirus according to a US-based research.

### Highlights:

- It is a vaccine primarily used against tuberculosis (TB).

- It's one dose is recommended to babies as close to the time of birth as possible, in countries where TB or leprosy is common.
- In areas where tuberculosis is not common, only children at high risk are typically immunized, while suspected cases of tuberculosis are individually tested for and treated.
- It contains a live but weakened strain of tuberculosis bacteria that provokes the body to develop antibodies to attack TB bacteria. This is called an adaptive immune response.
- Most vaccines create an adaptive immune response to a single pathogen. It may also boost the innate immune system, first-line defences that keep a variety of pathogens from entering the body or from establishing an infection.
- In countries that have deployed the BCG-tuberculosis vaccine in their immunisation programmes have seen fewer deaths from COVID-19. It is premature for India, that has had a consistent TB vaccination policy since 1968, to take comfort from the study.

### **3. Round-Tripping**

#### **Context:**

- Recently, the Supreme Court has quashed an income tax re-assessment notice issued by revenue authorities against the premier news broadcasting company.
- Income Tax department had accused NDTV of “round-tripping” finances in connection with a July 2007 issuance of step-up coupon bonds amounting to \$100 million through its U.K. subsidiary.

#### **About Round Tripping:**

- It refers to money that leaves the country through various channels and makes its way back into the country often as foreign investment. This mostly involves black money and is allegedly often used for stock price manipulation.
- It is often done through a series of transactions that don't have any substantial commercial purposes, which makes it fall within the trappings of GAAR.
- It mainly used for Tax concessions allowed in the foreign country encourages individuals to park money there and then reroute in to the country.
- The money returns to India by investing in offshore funds that in turn invest in Indian assets.
- Some of the other routes that have been used in the past are The Global Depository Receipts (GDR) and Participatory Notes (P-Notes).

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#### **4. Grounding of Planes Affects Dynamical Models of Weather Forecasts**

##### **Why in News?**

- In the ongoing COVID-19 lockdown, the grounding of the country's civilian aircrafts has deprived key source of weather data that the India Meteorological Department (IMD) uses for its forecasts.

##### **Highlights:**

- Data's captured by aircrafts to meteorological agencies:
- For the accurate weather forecasts:
  - ✓ Aircraft data about temperature and wind speed in the upper atmosphere is provided to meteorological agencies which is used in the dynamical models.
  - ✓ The dynamical models are run on supercomputers which ultimately give weather forecasts three days, or even two weeks ahead.
- Identify early developing of thunderstorms or swings in temperatures:
  - ✓ Inputs from aircraft are important for the dynamical models as it determines the initial conditions for weather models.
  - ✓ This data is also helpful to warn of developing thunderstorms or swings in temperatures that often begin at the heights aircraft traverse.

#### **5. Study lists 69 Existing Drugs that can TARGET CORONAVIRUS**

##### **Why in News?**

- Nearly a hundred scientists from across the globe worked together to study the genes of the coronavirus (SARS-CoV-2) and have published a list of drugs that can be re-purposed to treat COVID-19. They have also mapped out the human proteins that interact with those of the virus.
- The proteins of the virus must attach to the human proteins to cause the infection. The team studied 26 coronavirus genes that help in the production of these proteins.

##### **Highlights:**

- They studied human proteins and found 332 SARS-CoV-2 and human protein interactions. The team then listed 67 human proteins that can be targeted by 69 drugs to fight the infection.

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- These drugs include the existing FDA-approved drugs, drugs under clinical trials and/or preclinical compounds. When the virus invades the cells, it hijacks the cells' molecular machinery to replicate itself because it cannot do this on its own.
  - The drugs that have been identified may be able to inhibit these molecular machines so that the virus can no longer use them for its own survival. Some of these drugs will be able to decrease viral load and disease severity for patients. However, they still need to be further tested.
  - The list includes unexpected candidates such as entacapone used to treat Parkinson's disease and antiviral medication named ribavirin, which was administered to Nipah patients in Kerala during the 2018 outbreak.
  - Chloroquine, an antimalarial drug, and metformin, used to treat diabetes, were also found on the list.
  - The drugs/compounds that are being used are relatively well studied. Many of them are already approved for other diseases. One can easily look up what adverse side-effects, if any, are expected from these drugs.
  - Future studies are geared up to more deeply understand the exact molecular mechanisms used by the coronavirus to drive disease in humans. This could reveal additional drug targets and drugs to treat COVID-19.