INSPIREEE

INSPIRATIONAL SCRIPTS, PERSONALITIES AND INNOVATIVE RESEARCH OF EEE

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To become a high standard of excellence in Education, Training and Research in the field of Electrical and Electronics Engineering and allied applications

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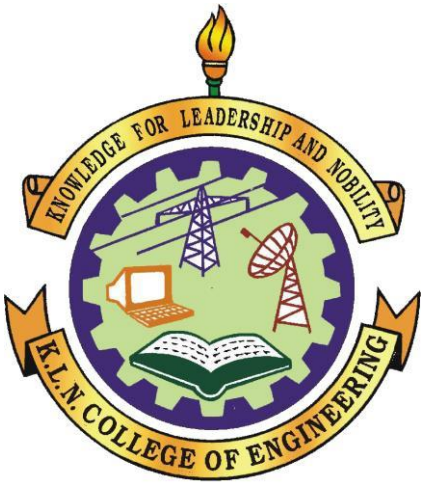
To Produce excellent, innovative and Nationalistic Engineers with Ethical values and to advance in the field of Electrical and Electronics Engineering and Allied Areas



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Pottapalayam – 630 612, Sivagangai District,

Tamil Nadu, India

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MESSAGE FROM HEAD OF THE DEPARTMENT

In this issue articles on the most recent topics presented by the student Electrical vehicles are desired of the future economic of our country.

A Briefly note on this presented opportunity are very high on this field.

Some of the articles guide lines for technical paper written in presentation. Once work will be appreciated only when it is presented well. As the paper will be presented in the National/International forum, special care should be taking before publishing in the articles. The recent fire accident hospitals and temples required more precaution measure to be taken to safe guards. Our loved only and properties and document protected for long period of time. Examination reforms and challenges will definitely improve the confidence of the student.

Best Wishes

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Fourth Industrial Revolution (or Industry 4.0)

Iswarya T K-192003
EEE – II Years / II Sem

The Fourth Industrial Revolution (or Industry 4.0) is the ongoing automation of traditional manufacturing and industrial practices, using modern smart technology. Large-scale machine-to-machine communication (M2M) and the internet of things (IoT) are integrated for increased automation, improved communication and self-monitoring, and production of smart machines that can analyze and diagnose issues without the need for human intervention.

The phrase Fourth Industrial Revolution was first introduced by Klaus Schwab, executive chairman of the World Economic Forum, in a 2015 article published by Foreign Affairs,[2] "Mastering the Fourth Industrial Revolution" was the 2016 theme of the World Economic Forum Annual Meeting, in Davos-Klosters, Switzerland.[3]

On October 10, 2016, the Forum announced the opening of its Centre for the Fourth Industrial Revolution in San Francisco.[4] This was also subject and title of Schwab's 2016 book.[5] Schwab includes in this fourth era technologies that combine hardware, software, and biology (cyber-physical systems),[6] and emphasizes advances in communication and connectivity. Schwab expects this era to be marked by breakthroughs in emerging technologies in fields such as robotics, artificial intelligence, nanotechnology, quantum computing, biotechnology, the internet of things, the industrial internet of things, decentralized consensus, fifth-generation wireless technologies, 3D printing, and fully autonomous vehicles.[7]

In The Great Reset proposal by the World Economic Forum, The Fourth Industrial Revolution is included as

a Strategic Intelligence in the solution to rebuild the economy sustainably following the COVID-19 pandemic[8]

First Industrial Revolution[edit]

The First Industrial Revolution was marked by a transition from hand production methods to machines through the use of steam power and water power. The implementation of new technologies took a long time, so the period which this refers to it is between 1760 and 1820, or 1840 in Europe and the United States. Its effects had consequences on textile manufacturing, which was first to adopt such changes, as well as iron industry, agriculture, and mining although it also had societal effects with an ever stronger middle class. It also had an effect on British industry at the time.[9]

Second Industrial Revolution[edit]

The Second Industrial Revolution, also known as the Technological Revolution, is the period between 1871 and 1914 that resulted from installations of extensive railroad and telegraph networks, which allowed for faster transfer of people and ideas, as well as electricity. Increasing electrification allowed for factories to develop the modern production line. It was a period of great economic growth, with an increase in productivity, which also caused a surge in unemployment since many factory workers were replaced by machines.[10]

Third Industrial Revolution[edit]

The Third Industrial Revolution, also known as the Digital Revolution, occurred in the late 20th century, after the end of the two world wars, resulting from a slowdown of industrialization and technological advancement compared to previous periods. The global financial crisis in 1929 followed by the Great Depression affected many industrialized countries. The production of the Z1 computer, which used binary floating-point numbers and Boolean logic, a decade later, was the beginning of more advanced digital developments. The next significant development in communication technologies was the supercomputer, with extensive use of computer and communication technologies in the production process; machinery began to abrogate the need for human power.[11]

German Strategy[edit]

The term "Industrie 4.0", shortened to I4.0 or simply I4, originated in 2011 from a project in the high-tech strategy of the German government, which promotes the computerization of manufacturing.[12] The term "Industrie 4.0" was publicly introduced in the same year at the Hannover Fair.[13] In October 2012, the Working Group on Industry 4.0 presented a set of Industry 4.0 implementation recommendations to the German federal government. The workgroup members and partners are recognized as the founding fathers and driving force behind Industry 4.0. On 8 April 2013 at the Hannover Fair, the final report of the Working Group Industry 4.0 was presented. This working group was headed by Siegfried Dais, of Robert Bosch GmbH, and Henning Kagermann, of the German Academy of Science and Engineering.[14]

As Industry 4.0 principles have been applied by companies, they have sometimes been rebranded. For example, the aerospace parts manufacturer Meggitt PLC has branded its own Industry 4.0 research project M4.[15]

The discussion of how the shift to Industry 4.0, especially digitization, will affect the labour market is being discussed in Germany under the topic of Work 4.0.[16]

The characteristics of the German government's Industry 4.0 strategy involve the strong customization of products under the conditions of highly flexible (mass-) production.[17] The required automation technology is improved by the introduction of methods of self-optimization, self-configuration,[18] self-diagnosis, cognition and intelligent support of workers in their increasingly complex work.[19] The largest project in Industry 4.0 as of July 2013 is the German Federal Ministry of Education and Research (BMBF) leading-edge cluster "Intelligent Technical Systems Ostwestfalen-Lippe (its OWL)". Another major project is the BMBF project RES-COM,[20] as well as the Cluster of Excellence "Integrative Production Technology for High-Wage

Countries".[21] In 2015, the European Commission started the international Horizon 2020 research project CREMA (Providing Cloud-based Rapid Elastic Manufacturing based on the XaaS and Cloud model) as a major initiative to foster the Industry 4.0 topic.

HUMAN DEVELOPMENT INDEX INDIA

Kirrendran V G V- 192026

EEE – II Years / III Sem

The project "Human Development: Towards Bridging Inequalities" responds to a strong endorsement by the NITI Aayog, State Governments and experts for continued collaboration on human development, moving from "Analysis to Action". The emphasis of the project is on promoting inclusive growth and supporting action oriented quality studies on issues of persistent inequality and disparity; as well as on giving a thrust to capacity development of a range of stakeholders

The Human Development approach has been the cornerstone of Indian planning since the 8th Five Year Plan. The concept has been embraced in such a significant manner that India has set global benchmarks in terms of measuring human development and preparing HDRs at the State and district levels.

Background:

The project "Human Development: Towards Bridging Inequalities" focusses on providing innovative policy options for tackling issues of persistent exclusion, particularly at the State level. In this context issues of inequality, with particular attention to gender and social inequalities, will be emphasised. Initiatives at the national level will provide an enabling framework for translating human development agenda into action at the State level.

Scope and Strategy of the HDBI project:

The HDBI project proposes to cover 15 States from 2012 till 2017 with a total budget of USD 2.7million {approximately Rs. 16.2 crores (1USD[at]INR 60)}. State level initiatives include: Preparation of State level Human Development Reports, District Human Development Reports, Regional Human Development Reports, Research based policy advocacy, Capacity development, Strengthening statistical systems and use of Community monitoring tools. National level initiatives include: HD Policy advocacy, Preparation of Regional/Thematic Human Development Reports,Capacity development, Strengthening statistical systems, Budget analysis for improving human development, and presentation of District Human Development Reports. HDBI project also aims to foster partnership across a range of stakeholders includingparliamentarians, the private sector, civil society organizations, universities, the media, etc.

Management Arrangement

Implementation Arrangements

The project is implemented by the NITI Aayog in collaboration with UNDP. The National Project Director (NPD), designated by the NITI Aayog, is responsible for overall management, and is supported by Project Manager for day-to-day operations of the project. The NITI Aayog signs a budgeted Annual Work Plan with UNDP on an annual basis, as per UNDP rules and regulations, and submitsa signed financial report as per UNDP rules. As a co-implementer, UNDP undertakes certain number of activities in the annual work plans.

National Steering Committee has been constituted vide Office Order dated 12 January 2011 to guide, monitor, review project expenditures against activities and outcomes; and approve Annual and Quarterly Work Plans.Likewise States are also required to constitute their ownState Project Steering Committees to provide guidance for project implementation at the State level.

LINEAR INTERGRATED CIRCUITS AND INDUSTRY APPLICATIONS

P.Vaisnavananthini-182001
EEE – III Years / V Sem

An **Linear integrated circuit** or **monolithic integrated circuit** (also referred to as an **IC**, a **chip**, or a **microchip**) is a set of electronic circuits on one small flat piece (or "chip") of semiconductor material that is normally silicon. The integration of large numbers of tiny transistors into a small chip results in circuits that are orders of magnitude smaller, faster, and less expensive than those constructed of discrete electronic components. The IC's mass production capability, reliability, and building-block approach to circuit design has ensured the rapid adoption of standardized ICs in place of designs using discrete transistors. ICs are now used in virtually all electronic equipment and have revolutionized the world of electronics. Computers, mobile phones, and other digital home appliances are now inextricable parts of the structure of modern societies, made possible by the small size and low cost of ICs.

Integrated circuits were made practical by mid-20th-century technology advancements in semiconductor device fabrication. Since their origins in the 1960s, the size, speed, and capacity of chips have progressed enormously, driven by technical advances that fit more and more transistors on chips of the same size – a modern chip may have many billions of transistors in an area the size of a human fingernail. These advances, roughly following Moore's law, make computer chips of today possess millions of times the capacity and thousands of times the speed of the computer chips of the early 1970s.

ICs have two main advantages over discrete circuits: cost and performance. Cost is low because the chips, with all their components, are printed as a unit by photolithography rather than being constructed one transistor at a time. Furthermore,

packaged ICs use much less material than discrete circuits. Performance is high because the IC's components switch quickly and consume comparatively little power because of their small size and close proximity. The main disadvantage of ICs is the high cost to design them and fabricate the required photomasks. This high initial cost means ICs are only practical when high production volumes are anticipated.

Integrated circuits can be classified into analog, digital, and mixed signal, consisting of both analog and digital signaling on the same IC. Analog ICs, such as sensors, power management circuits, and operational amplifiers (op-amps), work by processing continuous signals. They perform analog functions such as amplification, active filtering, demodulation, and mixing.

Analog ICs ease the burden on circuit designers by having expertly designed analog circuits available instead of designing and/or constructing a difficult analog circuit from scratch.

IC can also combine analog and digital circuits on a single chip to create functions such as analog-to-digital converters and digital-to-analog converters. Such mixed-signal circuits offer smaller size and lower cost, but must carefully account for signal interference

Digital integrated circuits can contain anywhere from one to billions of logic gates, flip-flops, multiplexers, and other circuits in a few square millimeters.The small size of these circuits IC allows high speed, low power dissipation, and reduced manufacturing cost compared with board-level integration. These digital ICs, typically microprocessors, DSPs, and microcontrollers, work using boolean algebra to process "one" and "zero" signals.

Among the most advanced integrated circuits are the microprocessors or "**cores**", which control everything from personal computers and cellular phones to digital microwave ovens. Digital memory chips and application-specific integrated circuits (ASICs) are examples of other families of integrated circuits that are important to the modern information society.

COVID-19 PANDEMIC IN INDIA
HARIKRISHNAN – 172047
VI Year – VII Sem

The **COVID-19 pandemic in India** is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first case of COVID-19 in India, which originated from China, was reported on 30 January 2020. India currently has the largest number of confirmed cases in Asia,[7] and has the second-highest number of confirmed cases in the world after the United States,[8][9] with more than 9 million reported cases of COVID-19 infection and more than 100 thousand deaths. The per day cases peaked mid-September in India with over 90,000 cases reported per day and have since come down to below 40,000 in December.[10][11]

On 22 March, India observed a 14-hour voluntary public curfew at the insistence of Prime Minister Narendra Modi. It was followed by mandatory lockdowns in COVID-19 hotspots and all major cities. Further, on 24 March, the prime minister ordered a nationwide lockdown for 21 days, affecting the entire 1.3 billion population of India. On 14 April, India extended the nationwide lockdown till 3 May which was followed by two-week extensions starting 3 and 17 May with substantial relaxations. From 1 June, the government started "unlocking" the country (barring "containment zones") in three unlock phases.[12][13][14][15]

In March, after the lockdown was imposed, the United Nations (UN) and the World Health Organization (WHO) praised India's response to the pandemic as 'comprehensive and robust', terming the lockdown restrictions as 'aggressive but vital' for containing the spread and building necessary healthcare infrastructure. At the same time, the Oxford COVID-19 Government Response Tracker (OxCGRT) noted the government's swift and stringent actions, emergency policy-making, emergency investment in health care, fiscal stimulus, and investment in vaccine and drug R&D and gave India a score of 100

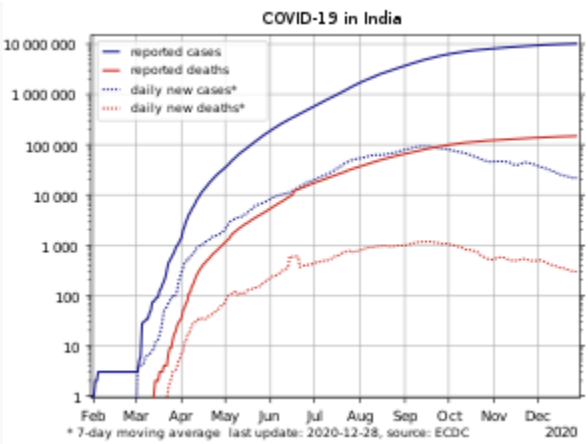
for the strict response. Also in March, Michael Ryan, chief executive director of the WHO's health emergencies programme noted that India had tremendous capacity to deal with the outbreak owing to its vast experience in eradicating smallpox and polio.[16][17][18] In June, India was ranked 56th of 200 countries in COVID-19 safety assessment report by Deep Knowledge Group.[19] Other commentators have raised concerns about the economic fallout arising as a result of the pandemic and preventive restrictions.[20][21] The lockdown was justified by the government and other agencies for being preemptive to prevent India from entering a higher stage which could make handling very difficult and cause even more losses thereafter.[22][23]

In July 2020, India's Ministry of Information and Broadcasting claimed the country's case fatality rate was among the lowest in the world at 2.41% and "steadily declining".[24] By mid-May 2020, six cities accounted for around half of all reported cases in the country – Mumbai, Delhi, Ahmedabad, Chennai, Pune and Kolkata.[25] As of 10 September 2020, Lakshadweep is the only region which has not reported a case.[26] On 10 June, India's recoveries exceeded active cases for the first time.[27] Infection rates started to drop significantly in September, and the number of daily new cases and active cases started to decline rapidly.[28] A Government panel on COVID-19 announced in October that the pandemic had peaked in India, and may come under control by February 2021.[29] India has over 30 anti-COVID vaccines in various stages of development and the first of these is expected to be introduced in early 2021.

The pandemic has left a severe impact on the Indian economy, leading to a negative growth rate for the first time in decades. Nevertheless, the economy started to rebound after the lockdown was eased. Increased requirement for consumption had led the government and private firms to repurpose their factories and production lines for manufacturing of more hospital beds, PPE and ventilators. India emerged as the world's second largest manufacturer of PPE during the pandemic. The Union

Government also launched a major self-sufficiency campaign to substitute imported products with domestically produced counterparts, especially to replace goods imported from China.

Main articles: Timeline of the COVID-19 pandemic in India (January–May 2020) and Timeline of the COVID-19 pandemic in India (June–December 2020)



On 12 January 2020, the WHO confirmed that a novel coronavirus was the cause of a respiratory illness in a cluster of people in Wuhan, Hubei, China, which was reported to the WHO on 31 December 2019.[31][32]

On 30 January, India reported its first case of COVID-19 in Kerala, which rose to three cases by 3 February; all were students returning from Wuhan. Apart from these, no significant rise in transmissions was observed in February. On 4 March 22 new cases were reported, including 14 infected members of an Italian tourist group.[33][34]

In March, the transmissions grew after several people with travel history to affected countries, and their contacts, tested positive. On 12 March, a 76-year-old man, with a travel history to Saudi Arabia, became the first COVID-19 fatality of India.[35]

A Sikh preacher, who had a travel history to Italy and Germany, turned into a "super spreader" by attending a Sikh festival in Anandpur Sahib during 10–12 March.[36][37] Twenty-seven COVID-19 cases were traced back to him.[38] Over 40,000 people in 20 villages in Punjab were quarantined on 27 March to contain the spread.[37][39]

On 31 March, a Tablighi Jamaat religious congregation event in Delhi, which had taken place earlier in March, emerged as a new virus super spreader event, after numerous cases across the country were traced back to it.

On 18 April, the Health ministry

announced that 4,291 cases were directly linked to the event.[40][41]

On 2 May, in Punjab, around 4,000 stranded pilgrims returned from Hazur Sahib in Nanded, Maharashtra. Many of them tested positive, including 27 bus drivers and conductors who had been part of the transport arrangement. As of 13 May, 1,225 pilgrims had been tested positive.[42][43][44]

Government responses[edit]

Main articles: Indian government response to the COVID-19 pandemic and Indian state government responses to the COVID-19 pandemic

The outbreak has been declared an epidemic in more than a dozen states and union territories, where provisions of the Epidemic Diseases Act, 1897 have been invoked, leading to the temporary closure of educational and commercial establishments. All tourist visas were suspended in March, as many of the earliest confirmed cases were individuals who had travelled from foreign countries.[45] State governments took various measures to contain the spread of the virus.

Testing and countermeasures[edit]

Testing[edit]

Samples tested	173,111,694
Tested positive[4]	10,286,709
Tests per 1 million people	125,456
Percentage tested positive	6.06
As of 29 December 2020 [46]	

Do's & Don'ts of COVID-19 released by Government of India

A testing facility at the National Centre for Disease Control in Delhi

A sample collection kiosk for COVID-19 testing in Kerala

The Union Health Ministry's war room and policy making team in New Delhi consists of the ministry's Emergency Medical Response Unit, the Central Surveillance Unit (IDSP), the National Centre for Disease Control (NCDC) and experts from three government hospitals.[47] They are part of policy decisions to decide how coronavirus should be tackled in the country.[47] A cluster-containment strategy is mainly being adopted, similar to how India contained previous epidemics, as well as "breaking the chain of transmission".[47][48][49] 15 labs across India led by the National Institute of Virology (NIV), Pune, are testing for the virus, with more labs being trained, as of early March.[50] On 13 March, 52 labs were named capable of virus testing.[51]

On 14 March, scientists at the National Institute of Virology isolated a strain of the novel coronavirus. By doing so, India became the fifth country to successfully obtain a pure sample of the virus after China, Japan, Thailand and the US.[52] The Indian Council of Medical Research (ICMR) said that isolation of the virus will help towards expediting the development of drugs, vaccines and rapid diagnostic kits in the country.[53] NIV has shared two SARS-CoV-2 genome sequences with GISAID.[54] On 16 April, China sent 650,000 testing kits to India[55] but their use was discontinued in view of a very low accuracy (of just 5.4%).[56] In May, National Institute of Virology introduced another antibody test kit ELISA for rapid testing, capable of processing 90 samples in a single run of 2.5 hours.[57]

Initial testing[edit]

Initially, the labs tested samples only from those with a travel history to 12 countries designated as high-risk, or those who had come in contact with anyone testing positive for the coronavirus, or showing symptoms as per the government guidelines.[58][59] On 20 March, the government decided to also include all pneumonia cases, regardless of travel or contact history after the country saw a sharp increase in the number of cases.[60] The first and second confirmatory tests for the virus has been made free by the government.[61] On 9 April, ICMR further revised the testing strategy and allowed testing of the people showing symptoms for a week in the hotspot areas of the country, regardless of travel history or local contact to a patient.[62] The Ministry of Health said that only 10 per cent of test capacity had been used per day till 15 March,[61] claiming that the number of tests was enough. However experts thought they were not, saying that community transmission may go undetected without adequate testing.[63] They also wanted to add more testing centres by including private laboratories.[63][59] In mid-March the government authorised accredited private labs to test for the virus.[64]

Expansion of tests[edit]

On 17 March, the Union Ministry of Health had decided to allow private pathology labs to test for COVID-19. The ministry official claimed that by allowing private labs, the work of testing can be doubled. The ministry said that National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited laboratories may soon be allowed.[65] Once set up, a person can get COVID-19 test done at a private lab after a qualified physician in a government facility recommends it.[66] The ICMR has appealed to the private labs to offer the tests for free as the government labs do.[65]

On 18 March, A top health ministry official said that a Swiss private company named Roche Diagnostics has been given the Food and Drug Administration (FDA) emergency approval to conduct tests for coronavirus. The Indian regulator has given them a licence to conduct diagnostic tests of the

virus on 17 March.[67] The Drug Controller General of India (DCGI) was assessing giving another firm licence while two Indian diagnostic companies have also sought approval for the coronavirus testing kits developed by them.[68] The government has also issued guidelines to cap the cost of sample testing by private labs at ₹4,500.[69]

On 19 March, Ramanan Laxminarayan, director of the Center for Disease Dynamics, Economics & Policy stated that India could be facing a "tsunami of cases within a few weeks" as testing increases and the reason for the low number of confirmed cases currently is due to under-testing. He also said that according to mathematical models applied in the US or UK at least 20%–60% of the population will be affected. Applying the same models in India means that at the lower end of the estimate there could be 300 million cases of which 4–8 million could be severe.[70]

111 additional labs for testing became functional on 21 March.[71] On 24 March, Pune-based molecular diagnostic company Mylab Discovery Solutions became the first Indian company to have received validation for its RT-PCR tests from National Institute of Virology and the Indian Council of Medical Research (ICMR). The test takes 2.5 hours and the company is looking to price it at around ₹1,200 (US$17), or Rs 80,000 for a 100 test kit.[72][73]

In April, Institute of Genomics and Integrative Biology of Delhi had developed low cost paper-strip test that could detect COVID-19 within an hour. Each test would cost ₹500 (US$7.00) and method could fulfill India's rapid need of testing.[74]

On 13 April, ICMR advised pool testing in the low infection areas with a positivity rate less than 2% to increase the capacity of the testing and save resources. In this process maximum five samples are tested at once and samples are tested individually only if a pool tests positive.[75] Andaman and Nicobar Islands[76] and Uttar Pradesh[77] have started doing pool testing.

On 14 April, ICMR and DGCI approved 18 new suppliers of test kits that included three Indian firms, bringing the total suppliers to 51.[78]

On 16 April, 650,000 rapid antibody test and RNA extraction kits were dispatched from China, and over 2 million kits were to be sent in next 15 days.[56] On 21 April, Health department of West Bengal alleged that large number of testing kits supplied by ICMR-NICED (National Institute of Cholera and Enteric Diseases) were giving inconclusive results. ICMR-NICED admitted that there was problem in the kits and said that they are addressing the issue.[79] While Rajasthan stopped using rapid testing kits as they were giving low accuracy of 5.4% in compared to expected 90% accuracy.[80] Later, ICMR advised all states to stop using rapid testing kits for next two days until their on-ground teams validates these kits.[81] Rapid antibody test kits were put on hold till further notice. The Chinese manufactures of the rapid testing kits said that the testing kits were approved by ICMR and the problem is not with the kits but with the way they were being used. However, Chinese manufacturers promised to cooperate with Indian authorities to resolve the issue.[82][83] Amid this, ICMR asked states to return the faulty kits which will be sent back to the Chinese suppliers and cancelled the order of all remaining kits.[84][85]

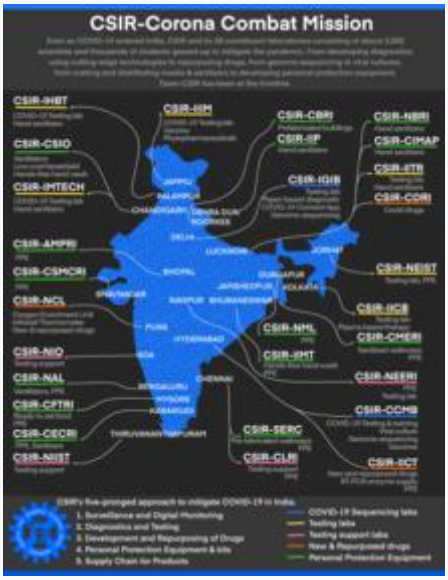
Testing community transmission[edit]

Testing for community transmission began on 15 March. 65 laboratories of the Department of Health Research and the Indian Council of Medical Research (DHR-ICMR) have started testing random samples of people who exhibit flu-like symptoms and samples from patients without any travel history or contact with infected persons.[86][87] As of 18 March, no evidence of community transmission was found after results of 500 random samples tested negative.[88] Between 15 February and 2 April, 5,911 SARI (Severe Acute Respiratory Illnesses) patients were tested throughout the country of which, 104 tested positive (1.8%) in 20 states and union territories. About 40% of the identified patients did not have travel history or any history of contact with a positive patient.[89] The ICMR advised to prioritise containment in the 36 districts of 15 states which had reported positive cases among SARI patients.[90] Till third

quarter of the year, India had attained highest number daily tests in world.[91]

Research and treatment[edit]

The Member (Health), NITI Aayog Dr. Vinod K. Paul along with the Secretary, Ministry of Health & Family Welfare, Shri Rajesh Bhushan and other officials are addressing a press conference on COVID-19, in New Delhi on October 13, 2020.



A poster showing the COVID-19 combat mission of Council of Scientific and Industrial Research

In Rajasthan, a combination of anti-malaria, anti-swine flu and anti-HIV drugs resulted in the recovery of three patients in March.[92] In the same month, the Indian Institute of Chemical Technology, the Council of Scientific and Industrial Research (CSIR) and Cipla launched a joint venture to develop anti-COVID-19 drugs.[93] Another Indian firm, Stempeutics, announced plans to introduce a stem cell-based agent for treating critical COVID-19 patients.[94] Following randomised clinical trials, another Indian firm Biocon got its novel biologic therapy by use of a newly formulated intravenous drug for treatment of patients.[95]

In March, a startup incubated in Pune's SciTech Park introduced 'Airon', a negative ion generator capable of reducing a room's viral load by 99.7%.[96] In April, funds for a number of preventive agents were released to initiate research.[97][98]

On 23 March, the National Task Force for COVID-19 constituted by the ICMR recommended the use of hydroxychloroquine for the treatment of high-risk cases.[99]

According to estimates, India has around 40,000 ventilators, of which 8,432 are with the public sector.[100] Various Indian PSUs, firms and startups,

including DRDO and ISRO, have since repurposed their production lines to manufacture general PPEs, full body suits and ventilators. They are also designing low-cost or mobile medical equipment.[101][102][103][104] The focus was to increase the production of low-cost, compact and portable ventilators that could cater to multiple patients at a time. This led to the creation of some of the world's smallest and cheapest ventilators.[105] The government aims to double the current capacity of ventilators by June 2020 with the assistance from PSUs. The government has also requested major private automakers to explore the possibility of manufacturing ventilators at their plants.[106] Maruti Suzuki, in collaboration with AgVa Healthcare, will supply 10,000 ventilators till end of the May.[107] From nil in near past, India was producing around 200,000 PPE kits and 250,000 N95 masks per day in May 2020.[108] By second half of month, India had emerged as world's second largest producer of PPE body coveralls.[109]

The Centre for Cellular and Molecular Biology has been working on genome sequencing of COVID-19.[110] In May, CCMB also started a partnership with a private company Eyestem Research to grow novel coronavirus strain in human lung epithelial cells for research and trials of anti-viral drugs.[111]

On 12 April, the ICMR invited health institutions and hospitals to participate in trials of convalescent plasma therapy and plasma exchange therapy. Later, the ICMR submitted a list of such institutes to the DCGI to start trials,[112] which the DCGI approved.[113] Several states were allowed by ICMR to start clinical trials of the plasma therapy.[114][115] In Delhi, a 49-year-old man who was on ventilator support became the first patient in the country, who recovered through plasma therapy in April.[116] Delhi CM Arvind Kejriwal said that the initial results of the plasma therapy treatment on four patients gave positive and encouraging results, adding that they had decided to conduct it on three more patients.[117] However, the ICMR later stated that there is no robust evidence to support convalescent plasma therapy as a routine therapy, describing it is as an emerging and experimental therapy. It

has some risks, which include life-threatening allergies and lung injuries. The ICMR have since started multi-centre clinical trials to ensure the treatment's safety and efficacy in treating COVID-19 patients across the country.[118]

In late July, Cipla and Indian Institute of Chemical Technology launched jointly developed anti-viral drug favipiravir at cost of 10% of existing alternative in the market, followed by Jenburkt pharmaceuticals and Lupin Limited launching same at even lower cost.[119][120]

Development of anti-COVID vaccines[edit]

This section **may contain an excessive amount of intricate detail that may interest only a particular audience**. Please help by spinning off or relocating any relevant information, and removing excessive detail that may be against Wikipedia's inclusion policy. *(December 2020) (Learn how and when to remove this template message)*

Prime Minister Narendra Modi visits the Serum Institute of India, in Pune to review COVID-19 vaccine trials, on November 28, 2020.

Pune-based Serum Institute of India announced that it would apply for clinical trials of certain strains from Drug Controller General of India (DCGI) in April. As per company president Adar Poonawalla, a vaccine for COVID-19 will be delivered within a year. However, it may not be effective on 20 to 30% people.[121] Two other companies are also trying to develop a vaccine: Zydus Cadila, which is replicating viral vector and developing a DNA plasmid vaccine,[122] and Hyderabad-based Bharat Biotech, in collaboration with US based FluGen, which is expecting the first

clinical trials of a nasal vaccine by late 2020.[123] As of late February, the Serum Institute of India had begun animal trials of vaccine candidates,[124] followed by Zydus Cadila in March.[125] ICMR partnered with Bharat Biotech in May to develop COVID vaccine completely in India.[126] Till May, there were over 30 candidates of COVID-19 vaccine in development in India, many of which were already in pre-clinical tests.[127] Per reports emerged in July, ICMR was preparing to launch BBV152 COVID vaccine or Covaxin, India's first COVID-19 vaccine on 15 August following its ongoing human trials in July.[128] Although, later deadline was cited as only meant to cut "red tape" and expected timeline of any Indian vaccine not to be before 2021.[129] COVAXIN has been reported to have positive results on animals in building immunity against COVID-19 in pre-clinical trials.[130] In mid-July, Zydus Cadila too had followed with human trials of its vaccine named *ZyCoV-D*.[131] In early August, SII's got approval from DCGI for trial phases II & III.[132] SII has also joined GAVI in a partnership with Bill & Melinda Gates Foundation to produce 100 million doses of vaccine for developing countries.[133]

In September, India's science minister Dr. Harsh Vardhan announced that the first vaccine for use will be available by first quarter of 2021.[134] 30 million health workers directly dealing with COVID patients, especially doctors and other medical personnel are supposed to be first to receive the vaccine.

MV/LV Transformers, where everything starts…

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EEE – III Years / V Sem

ABSTRACT

The general term power supply in LV networks refers to the supply of electrical energy. The power supply, and more generally the different supplies, are provided by sources (mains supply, batteries, generator sets, etc.) which can be MV/LV transformers, diesel generator sets, and UPSs.

This technical article will explain the most common power supply for LV networks provided by a MV/LV transformer. Don't be confused, the same transformer with or without some modifications can be used also as backup power supply, special power supply for safety services or auxiliary power supply.

Let's see now the the most common power supply source – transformers that are used in MV/LV networks.

MV/LV transformers are generally divided into three types depending on their construction: Oil, Air insulated and Resin insulated dry-type transformers.

Contents:

1. Oil transformers

The magnetic circuit and the windings are immersed in a liquid dielectric that provides insulation and evacuates the heat losses of the transformer.

This liquid expands according to the load and the ambient temperature. PCBs and TCBs are now prohibited and mineral oil is generally used. It is flammable and requires protective measures against the risks of fire, explosion and pollution.

The four types of immersed transformer:

- Free breathing transformers,
- Gas cushion transformers,
- Transformers with expansion tank and
- Transformers with integral filling, only the latter are currently installed.

Structural standards for immersed transformers

Power from 50 to 2500 kVA (25 kVA possible):

Primary voltage up to 36 kV

Secondary voltage up to 1.1 kV

Power > 2500 kVA:

HV voltage greater than 36 kV

IEC 60076-1, IEC 60076-2, IEC 60076-3, IEC 60076-4, IEC 60076-5

1.1 Free breathing transformers

A quantity of air enters the surface of the oil and the cover allows the liquid to expand with no risk of overflowing. The transformer "breathes", but the humidity of the air mixes with the oil and the dielectric strength deteriorates.

1.2 Gas cushion transformers

The tank is sealed and a cushion of neutral gas compensates for the variation in volume of the dielectric (risk of leak).

1.3 Transformers with expansion tank

To limit the previous disadvantages, an expansion tank limits the air/oil contact and absorbs the overpressure.

However the dielectric continues to oxidise and take in water. The addition of a desiccant breather limits this phenomenon but requires regular maintenance.

1.4 Transformers with integral filling

The tank is completely filled with liquid dielectric and hermetically sealed. There is no risk of oxidation of the oil.

THE SMART GRID

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The Smart Grid

Maybe you have heard of the Smart Grid on the news or from your energy provider. But not everyone knows what the grid is, let alone the Smart Grid. "The grid," refers to the electric grid, a network of transmission lines, substations, transformers and more that deliver electricity from the power plant to your home or business. It's what you plug into when you flip on your light switch or power up your computer. Our current electric grid was built in the 1890s and improved upon as technology advanced through each decade. Today, it consists of more than 9,200 electric generating units with more than 1 million megawatts of generating capacity

connected to more than 300,000 miles of transmission lines. Although the electric grid is considered an engineering marvel, we are stretching its patchwork nature to its capacity. To move forward, we need a new kind of electric grid, one that is built from the bottom up to handle the groundswell of digital and computerized equipment and technology dependent on it—and one that can automate and manage the increasing complexity and needs of electricity in the 21st Century.

What Makes a Grid "Smart?"

In short, the digital technology that allows for two-way communication between the utility and its customers, and the sensing along the transmission lines is what makes the grid smart. Like the Internet, the Smart Grid will consist of controls, computers, automation, and new technologies and equipment working together, but in this case, these technologies will work with the electrical grid to respond digitally to our quickly changing electric demand.

What does a Smart Grid do?

The Smart Grid represents an unprecedented opportunity to move the energy industry into a new era of reliability, availability, and efficiency that will contribute to our economic and environmental health. During the services

first, for example. In addition, the Smart Grid will take greater advantage of customer-owned power generators to produce power when it is not available from utilities. By combining these "distributed generation" resources, a community could keep its health centre, police department, traffic lights, phone System, and grocery store operating during emergencies. In addition, the Smart Grid is a way to address an aging energy infrastructure that needs to be upgraded or replaced. It's a way to address energy efficiency, to bring increased awareness to consumers about the connection between electricity use and the environment. And it's a way to bring increased national security to our energy System—drawing on greater amounts of home-grown electricity that is more resistant to natural disasters and attack.

Giving Consumers Control

The Smart Grid is not just about utilities and technologies; it is about giving you the information and tools you need to make choices about your energy use. If you already manage activities such as personal banking from your home computer, imagine managing your electricity in a similar way. A smarter grid will enable an unprecedented level of consumer participation. For example, you will no longer have to wait for your monthly statement to know how much electricity you use. With a smarter grid, you can have a clear and timely picture of it. "Smart meters," and other mechanisms, will allow you to see how much electricity you use, when you use it, and its cost. Combined with real-time pricing, this will allow you to save money by using less power when electricity is most expensive. While the potential benefits of the Smart Grid are usually discussed in terms of economics, national security, and renewable energy

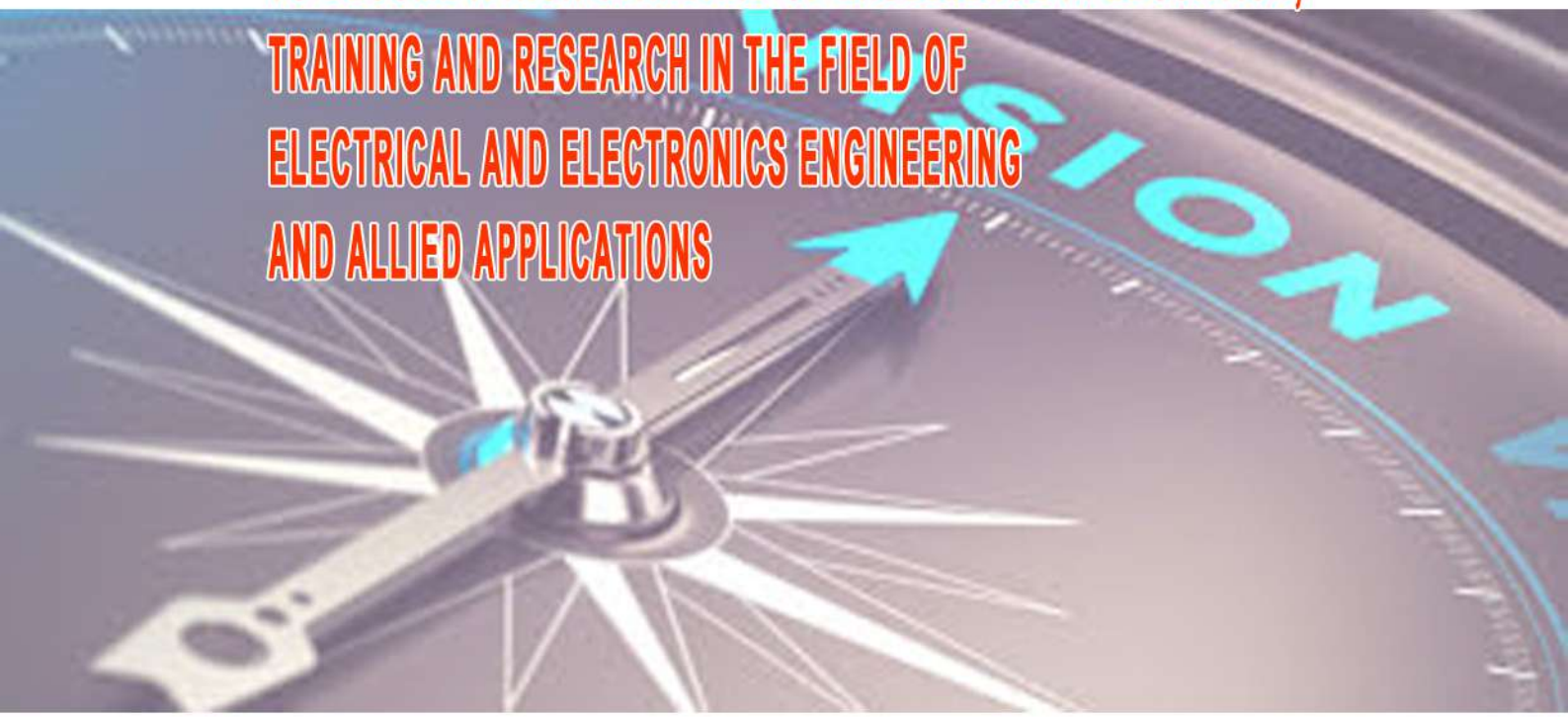
goals, the Smart Grid has the potential to help you save money by helping you to manage your electricity use and choose the best times to purchase electricity. And you can save even more by generating your own power.

Building and Testing the Smart Grid

The Smart Grid will consist of millions of pieces and parts—controls, computers, power lines, and new technologies and equipment. It will take some time for all the technologies to be perfected, equipment installed, and systems tested before it comes fully on line. And it won't happen all at once—the Smart Grid is evolving, piece by piece, over the next decade or so. Once mature, the Smart Grid will likely bring the same kind of transformation that the Internet has already brought to the way we live, work, play, and learn.

VISION

TO BECOME A HIGH STANDARD OF EXCELLENCE IN EDUCATION,
TRAINING AND RESEARCH IN THE FIELD OF
ELECTRICAL AND ELECTRONICS ENGINEERING
AND ALLIED APPLICATIONS



MISSION

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WITH ETHICALVALUES AND TO ADVANCE IN
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