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In This Issue

Digital Learning During COVID-19 Pandemic: Converting Crisis into Opportunity

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At a time when the whole world is distressed from a deadly COVID-19 pandemic, India is planning to convert this crisis into an opportunity and strengthen its fight by becoming *Aatmanirbhar Bharat* or *self-reliant India*, focusing on five pillars namely: *economy*, *infrastructure*, *system*, *vibrant demography* and *demand.* The Government has planned to implement the development in five different phases. The term *Aatmanirbhar Bharat* was originally coined by the Hon'ble Prime Minister of India, Shri Narendra Modi during his address to the nation on 12th May, 2020 which was also well received by the Indians to mitigate the economic crisis of India and make India economically strong in the coming days (*Source:https://www.india.gov.in/spotlight/building-atmanirbhar-bharat-overcoming-covid-19*). Prior to this crisis, on 1st July, 2015 under the name of "Digital India", a flagship initiative was undertaken by our visionary Prime Minister Shri Narendra Modi to transform India into a digitally empowered society and a knowledge-based economy. The main aim of this plan was to connect India's rural areas with high-speed internet connectivity. The plan aimed at providing 2.5 lakh Wi-Fi hotspots not only for academic institutions but also for the citizens who can take advantage of various e-Governance and e-services. Around four lakh public internet access points have been developed to make digitally empowered citizens. In this regard, an amount of Rs.1,13,000.00 crore was allocated during the Union budget (2015) to mitigate the scheme. The effort and plan which was carried out in 2015 is certainly making this crisis into an opportunity to think beyond the traditional way of working.

As part of the Digital India programme, the Indian government launched the schemes such as National e-Governance plan (DIP, MyGov.in, UMANG, PAN, AADHAR, digital locker, etc.), Administration *(*E-Panchayat, e-NAM, E-bill payments for electricity, water, property, tax etc.*),* Finance (RuPay, BHIM, DigiDhan, GST, e-way bills etc.), Education *(*Digital Board, CBSE, NCERT, AICTE, NEET Portals, and E-Basta, and e-Pathshala*) and many others* services such as DISHA, INDEA, IDEATE, COE-IT, CERT-IT etc. to unlock the path towards empowering India.

Digital India has three core components: Digital Infrastructure as a Utility for every Citizen, Governance & Services on Demand and Digital Empowerment of Citizen, along with nine Pillars i.e. Information for all, IT for Jobs, E-Kranti, electronic delivery of services, Universal Access to Mobile connectivity, Early Harvest

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Programmes, Broadband Highway, Electronics Manufacturing, Public Internet Access Programme, and E-Governance to reform Government through the use modern technology.

The Digital India campaign has witnessed a slew of initiatives to improve the educational system in India by means of digital programmes. One of the flagship programmes i.e. **"National Mission on Education through ICT (NMEICT)"** is being carried out by the Ministry of Human Resources and Development (MHRD), GoI. The main objective of the Ministry is to formulate the National Policy on Education and to ensure that the "Digital Literacy Programme" reaches every individual which in turn will enhance the educational opportunities in our country.

The COVID-19 outbreak has been tough for all. It has affected every facet of human life and living style. Livelihoods of many workers, especially the migrant labour have got almost shattered. Lakhs of migrant labours have returned to their native districts from frontline industrial states like Maharashtra, Gujarat, Punjab, Chandigarh, Andhrapradesh & Tamilnadu etc.

The educational sector, especially higher education is moving towards enhancing the quality of education by promoting various digital platforms (ICT initiatives) to meet the COVID-19 challenges such as SWAYAM Online Courses, UG/PG MOOCs, e-PG Pathshala, SWAYAM Prabha, National Digital Library of India (NDLI), ShodhGanga, Vidwan, Spoken Tutorials, e-Yantra, FOSSEE, Virtual Lab, e-ShodhSindhu, NPTEL, National Academic Depository (NAD), Campus Connectivity, Talk to a Teacher, Ask A Question, e-Acharya, etc. which can be accessed by the teachers, students, and researchers in universities and colleges for broadening their horizon for learning. NAD is an initiative to facilitate digital issuance, storage, access and verification of academic awards issued by different academic institutions. NAD in itself is an exemplary, innovative and progressive vision of GoI under the "Digital India Mission" and its main objective is to make available the digital copy of Academic Certificates for each and every Indian.

During the countrywide lockdown from 23rd March, 2020, the online learning through SWAYAM (around 900 UG/PG courses available) recorded fifty thousand enrolments, which confirm its popularity among Indian youths towards e-learning during this pandemic. The major regulatory bodies of MHRD such as UGC, AICTE, ICSSR etc. have instructed their respective Higher Education Institutions (HEI's) to incorporate more and more e-learning activities among the learning communities through different e-learning platforms. In this current situation, Union Minister of HRD Shri Ramesh Pokhriyal 'Nishank' has been working tirelessly with an enthusiastic zeal and has launched numerous educational flagship programmes with a great vision to empower India digitally. On 12th April, 2020 Union HRD Minister Shri Pokhriyal launched YUKTI (Young India Combating COVID with Knowledge, Technology and Innovation), a unique portal and dashboard to monitor and record the efforts and initiatives of MHRD. The portal intends to cover the different dimensions of COVID-19 challenges in a very holistic and comprehensive way. The portal will cover both qualitative as well as quantitative parameters for effective delivery of different services to the academic communities at large.

The launch of 'PM eVIDYA' programme brought a ray of hope for students and parents in the most difficult COVID-19 emergency situation, which is the fifth and last instalment of Union Government's Rs 20 lakh crore COVID-19 package. The PM e-VIDYA programme would be one of the major steps which the present government will take for the education sector during this pandemic. One of the main components of the new programme is the 'One Class One Channel' initiative where classes will be conducted on dedicated channels in the television. Twelve DTH channels will be dedicated to the programme, i.e. one channel for each class from one to twelve. The government has timely launched Swayam Prabha DTH channels to support and reach to those who do not have access to the basic internet connectivity and subsequently further 12 more channels will be added to strengthen the system. The Swayam Prabha is HRD ministry's free-to-air education channels, which consists of a group of 32 DTH channels that provide educational content. In this context, the National Council for Educational Research and Training (NCERT) has already started working on the content for the channels. The Ministry of Human Resource Development (MHRD) instructed NCERT to keep the content ready before the scheme is officially launched.

COVID-19 pandemic is not only a severe medical concern, but also brings varied emotions and psycho-social disorders for many. In a historic and maiden effort to relieve the student community in distress during the troubled time of this pandemic, the Central University of Odisha launched a helpline *"Bharosa"* which was inaugurated virtually by Dr. Ramesh Pokhriyal 'Nishank', Union HRD Minister for providing Cognitive Emotional Rehabilitation Services to all University Students of Odisha.

Needless to say, the post-COVID-19 situation has transformed the traditional classroom teaching pattern to the one driven by digital technology. The interruption caused in the delivery of education in the old normal scenario has prompted the CUO to think as per the new normal practices. We may be physically separated but digitally it is giving us scope to reach to our students and faculty members through various Webinar series. The series of webinar has been conducted on a virtual platform with a wide range of themes such as: Public Broadcasting Service during COVID-19, ICT based sessions for the students during COVID-19, Women Development in the pandemic period, Strengthening the cultural heritage and literature of Odisha, Symposium on Public Policy, Management and Skill Development: a triad for social transformation, and Biodiversity,

environment and health etc. Due to the situation arising out of the COVID-19 outbreak, the Central University of Odisha has conducted the first ever Home-Based Open Book Examinations (HOBE) for Final/Terminal Semester Students with 100 percent attendance and it is a great success keeping in view the digital connectivity issues in the state of Odisha.

The present pandemic situation has forced all the educational stakeholders to find out an alternative way of learning and make this crisis into an opportunity by providing suitable platforms for the learners. Digital education is here to stay for a long time and it is high time to tap optimally the vast resources like knowledge, skills and outreach.

Given the foregoing technological arrangements and experiences, there is a need for offering training courses on Online Teaching and Learning for the junior faculty in particular. The lessons learned so far from the experience of digital technology is encouraging. While digital technology is serving the purpose of a large number of students, a significant number of the less fortunate students are unable the reap the benefits in totality owing to poor telecom connectivity and low bandwidth. A separate set of initiatives are therefore required to plug this digital divide.

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Weekly E- Essay Series of Scholarly Articles on Reimagining Indian Universities

A 'Weekly E-Essay Series of Scholarly Articles on 'Reimagining Indian Universities' was launched on AIU Website on 15th May, 2020 as a part of the change which AIU seeks to bring about in the academics in this day and age of COVID-19. The essays scheduled for release in this series are in a broad range of fields covering a variety of topics pertinent to 'Reimagining Indian Universities' received from distinguished experts and authorities in the area of Indian higher education included in the Book 'Reimagining Indian Universities' edited by Dr. Ms.Pankaj Mittal and Dr Sistla Rama Devi Pani. In the series, every week one scholarly article written by an erudite scholar of Indian academia is being released on the AIU Website. The series was initiated with the essay of Prof Bhushan Patwardhan, Vice Chairman, University Grants Commission, India on 15th May, 2020.

The essays are unique, enlightening and inspirational. Those who are interested in reading these essays may browse AIU Website: www.aiu. ac.in. ❑

Status of Online Teaching at Higher Education Level during COVID-19 Pandemic

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The COVID-19 pandemic has led to closing down of all institutions imparting face to face mode of teaching globally. In India, the University Grants Commission (UGC) instructed all its institutions running regular courses to opt online classes during the pandemic. The state of Odisha too is adhering to the decision of the UGC. The present survey is intended to study the experiences and problems confronted by the students during and after online classes. The undergraduate, postgraduate and research degree students participated in the online survey in a sizable number. The students engagement during and after classes characterized by reading of digital study materials, asking questions for doubt clearing, reading of PPTs, noting down important points in the class and preparing class notes. Relating to the benefits of online classes, students viewed that it saves time in course coverage, improves their self-learning habits and exposed to a wide variety of digital materials and collaborative technologies. Students are confronted with serious problems like, poor network connectivity, high rate of data consumption and physical discomforts. The suggestions to teachers, institutions and the Government for improvement of online classes are given at the end.

Around the world even the developed countries are stunned by COVID-19 pandemic. It caused closing down of all educational institutions caring the life of billions of students, teachers and other stakeholders. Today 1.2 billion students are affected by lockdowns globally. As per Commonwealth, *there are still 574 million students affected by institutional closures. Countries were clearly not prepared and had to look for immediate solutions. Online provision was the preferred option* (Commonwealth of Learning, 2020a). COL's experience shows that *open, distance and online learning, if done well, can have the same outcomes as campus education without requiring teachers and learners to be in the same place at the same time* (Commonwealth of Learning, 2020b). However, all colleges and universities in India are currently not well-prepared to fully utilize the potential of online learning. India, having the third largest higher education system

has been taking the pain. As an interim measure, UGC advised all higher education institutions to opt for online teaching as an immediate strategic solution for continuity of learning activities in the academic year 2020-21. The Government of Odisha has shown its proactiveness to execute the decision of online teaching for all its universities, autonomous and affiliated colleges and self-financing institutions. It also issued a notification to start online classes from 13th July 2020 in all its higher education institutions. The Government instructed teachers to provide soft copies of notes, text books, PPTs and recommended lectures either through WhatsApp or e-mail to students. Teachers have been instructed to take online classes for at least 2-3 hours a day for 3 days a week using Google Meet, Zoom or Skype or other digital platforms.

An overview of the higher education institutions of Odisha reveals that it has 18 state public universities including one open university, 8 state private universities, 2 private deemed universities and 1641 affiliated degree colleges of different liberal and professional courses. The 1641 affiliated colleges shared a large part of student's strength having a sizeable number of students from rural and remote locations. The electronic and print Media raising the issues like scarcity of electronic gadgets, poor network connections and lack of teachers' exposure to online teaching in the remote locations. Researchers' personal observation of online classes also reveals poor network connectivity, extreme data consumption, poor attendance and inattentiveness of a sizeable number of students during online classes. The Government of Odisha has implemented online teaching program in its higher education institutions without any baseline survey on the readiness of relevance and required factors due to scarcity of time. Thus, there is a need to have a survey on students' experiences relating to content delivery and pedagogical skill of the teachers, their engagement in, during and after classes, problems that they confront with and suggestions for improvement of online classes.

Much of the early researches on online instruction focused on accessibility of needed technologies for creating a sense of engagement, foster the sharing of information and promote individual gratification among

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the students. The pedagogical, organizational and institutional issues were not given due consideration. A few studies also demonstrated a need for continuous training of both students and faculty members on the most effective use of online technologies (Davidson-Shivers, et al., 2000; Warschauer, 1998). The review reveals that students cannot shift traditional to online; the interplay between design, delivery, and user characteristics is needed for better understanding of students (Schrum, 1995). The study also reveals that in this fastest growing age of e-Learning technology, learner needs, demands and preferences are increasing and changing day by day. Learner choices now become the primary requirement for the growth of the whole e-learning scenario. A learner centric e-Learning system with decision making feature for learner in their learn time can be the only solution to meet the demand and requirement of learner (Kakoty, 2014). Richards and Ridley (1997) found that the factors, such as prior computer knowledge or online experiences, helped students to persist in taking online courses. Reviews relating to student participation in online learning reveal that promptness of instructor's response to online activities, queries of students increases students' engagement (Dwivedi, et al., 2019). Zhou, Li, Wu and Zhou (2020) found that in online teaching, some teachers copy the classroom teaching content to online teaching courses, ignoring subjective guidance, lacking teacher-student interaction, and poor teaching results. At the same time, some students, due to lack of self-control and self-learning ability, lacked face-to-face teacher or even parental supervision, online learning became a form, and the autonomous learning effect was not satisfactory.

The above reviews focused on the accessibility of necessary technology and teacher's promptness, pedagogical and content organization style, impacts on students' engagement and the most vital point is to understand the students' needs and experiences so as to improve the online classes. The present research has been designed with the following research questions.

- What is the perception of students about online classes?
- What are the problems confronted by the students in online classes?

Methodology

This online survey was supported by google form. Students pursuing under graduate, post graduate, M.Phil and other Postgraduate diploma courses and integrated courses were the target population. The link of the questionnaire was shared through different online platforms to universities and affiliated colleges. All the students with whom link of the questionnaire were shared may be defined as accessible population. The questionnaire link was open for five days and finally 727 responses were received. A questionnaire having 18 restricted items and one open-ended item for suggestions were included in the study. Items are formed on the demographic information of the respondents, their experiences relating to content delivery and pedagogical skills of the teachers, engagement during and after class, problems confronted by the students and their suggestions for improvement of the online classes.

Result

Table No.-1 shows that reasonable number of universities participated in the survey if we look at the total number of universities in the state. The number of affiliated colleges involved in the survey seems less in proportionate to the total number of the colleges in the state but those colleges are scattered throughout the state. Students pursuing UG and PG or above courses proportionately represented in the sample. But the sample seems more crowded with Urban and female student representation. Location and social category participation is also not representative adequately.

Use of Devices and Platforms

The responses of the students reveals that 95.9 per cent are using mobile phones, 14.2 per cent are using laptops and 1.7 per cent are using computers or tablets or notepads, etc. Few students have facility of multiple devices. Whereas, 63.2 per cent teachers use mobile phones, 81 per cent use laptops and 25.4 per cent use computers or tablets or notepads. This also shows that few teachers are using multiple devices during online classes. Most of the students and teachers (85.3 per cent) use Goggle Meet whereas, 40.2 per cent use Zoom platform. Microsoft team, and Skype conference

Profile of Students : Table-1: Profile of Students

Institutions		Courses (%)			Gender (%)		locations				Social Categories		
Universities	Colleges	UG	PG	M. Phil & PhD	Male	Female	Urban	Semi Urban	Rural	Remote and Hill	Gen	SC	ST
5	43	65.1	33	1.9	18.7	81.3	41.9	20.3	36.3	0.9	76.1	14.3	9.6

are used by very few (5.6 per cent and 5.2 per cent respectively). The responses also reveals that 17 per cent students are using other platforms like, blackboard collaborate, goggle handouts, etc.

Engagement of students

Fig. No.1 shows that most of the students (80 per cent) engage themselves in the online classes by listening the lecture of their teachers and peer interactions. They also read the PPTs prepared by their teachers (61.9 per cent) and ask questions to their teachers to clarify doubts (60.2 per cent). About half of the students (48.7 per cent) students also note down the main points in their diary. The collaborative technologies and feedback mechanism through Google platform are used by few students.

Fig.No.1.Nagment of Students During Online Classes
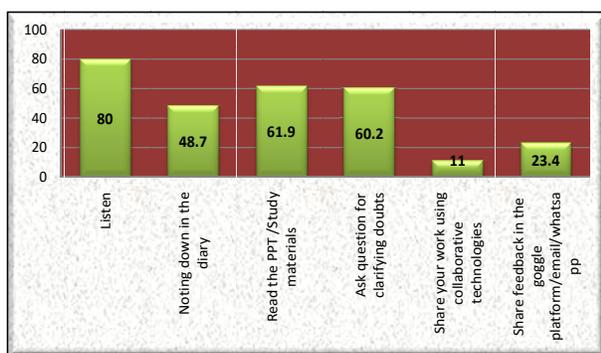
Fig.No.2 shows that more than half of the teachers share online materials (59.1 per cent) and PPTs (69.7 per cent) to students after class. 45.4 per cent teachers share short notes on the topic taught to the students just after class. Very few teachers share the ebooks, references, scan copy of materials in whatsapp or email and sometimes send the hard copy materials (where student group is very small).

Fig.No.2.Post Class Activity by the Teachers
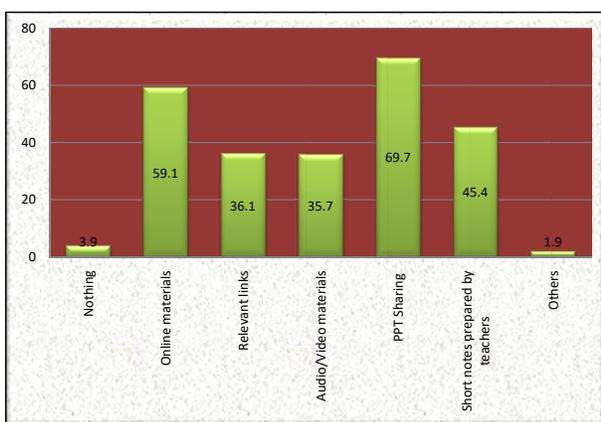
Fig. No.3 depicts that more than 60 per cent students use digital devices for their study and prepare their own hand written notes. However, about one-third of the respondents (30.3 per cent) still use hard copy of books.

Fig. No.-3.Post Class Activity by the Students
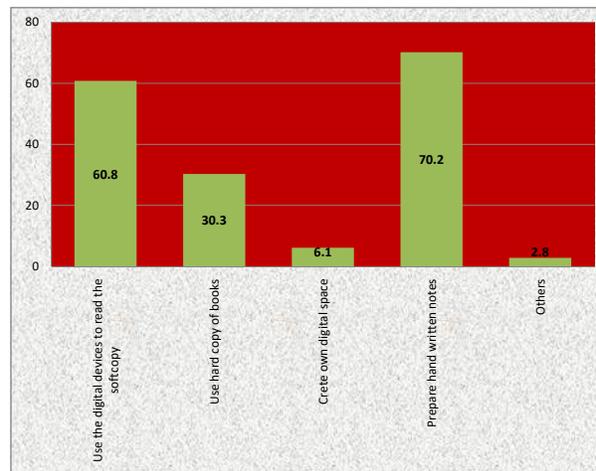
Box 1: In Nutshell

1. Both students and teachers are using digital materials

2. Both are putting effort at their end to make success of the online classes

3. Both are using face to face mode strategy of teaching and learning in online classes

4. Both are poor in using the collaborative technology and Google feedback mechanism

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Fig. 4 show that 63.3 per cent of students agreed that online classes save time for course coverage whereas, 16.4 per cent of students disagree with that statement and 20 per cent students are in doubt about the statement.

It is also found that 37.4 per cent of students agreed with the statement that students are more attentive and disciplined in online classes. 44.4 per cent students have shown their disagreement to this statement and 22.2 per cent students are in doubt.

The responses also indicate that 60.4 per cent of students agreed that online classes are giving them exposure to variety of materials than face to face mode gives. 24.7 per cent of students disagreed with the statement.14.9 per cent students are in doubt about the statement. Most of the students (83.1 per cent) feel that their teachers are serious about online classes.16.9 per

Fig.No-4 Students' Perception towards Online Classes

Goes Well
63.3% students agreed thatOLC saves time for course covergae
37.4% agreed that students attentive and disciplined
60.4% students agreed that OLC gives exposure to wide variety of materials
83.1% of students feel their teachers are serious about OLC

Does n't go Well
16.4% students disagreed thatOLC saves time for course covergae
44.4% disagreed that students are attentive and disciplined in OLC
24.7%students disagreed that OLC gives exposure to wide variety of materials
16.9%% of students feel that their teachers serious for OLC partly or not at all

cent of students feel their teachers are either partly or not serious.

Experiences of Students in Attending Online Classes

Fig.No.5. depicts 42.2 per cent students responded that online class do not provide social learning atmosphere compared to face to face mode. About one-third of students feel that quality of teaching is decreased (31.6 per cent) and about same proportion of students (28.8 per cent) feel that the quality of learning is decreasing. However, 83.1 per cent students responded that teachers are serious for online classes. The perceived problem may be due to accessibility or competency of teachers to manage online classes.

**Fig. No. 5.Students Responses on Quality of Online Classes**
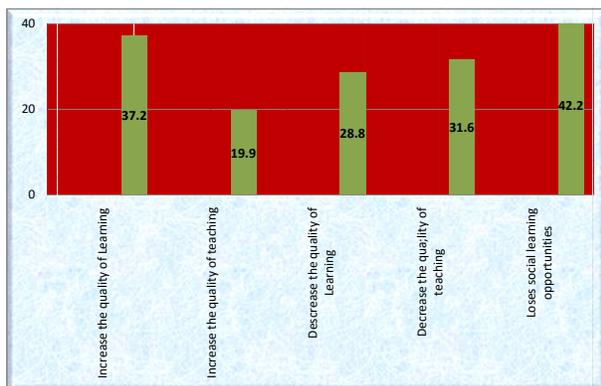
Fig.No.6 shows that most of the students (67.6 per cent) felt that their self-learning ability has been increased and approx half of the students responded that they have learnt about collaborative technology for learning. The figure also depicts, 32.8 per cent of students responded that online classes has increased their communication skills. More than 20 per cent students responded that online classes have increased their interpersonal skill and attention span.

Fig.6. Development of Learning Skills Through Online Classes
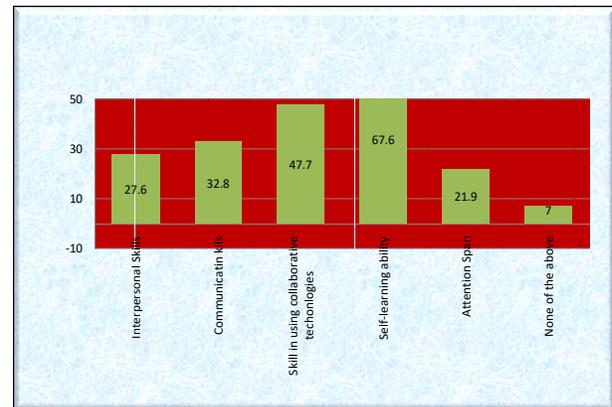
Fig. No.7 indicates more than 50 per cent students responded that their teachers are using PPTs, white boards, hard and soft study materials, interact with students and try to contextualize the curriculum. More than 30 per cent students responded that teachers provide relevant information about the contents and try to cover the syllabus. Only 17.3 per cent students are of the view that teachers interact with them and solve their doubts.

Fig.No.7. Benefits of Online Classes
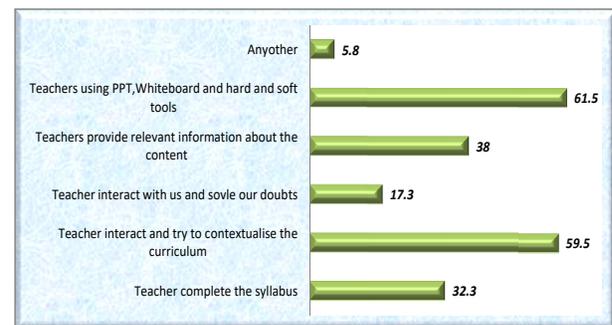
Problems with online classes

Fig No.8 shows 79 per cent of students felt that they are facing network problem partly or severely. It persists as a problem in all the locations: urban, semi urban, rural and hilly area.

Fig.No.8 Responses of the Students on the Problem of Mob. Network
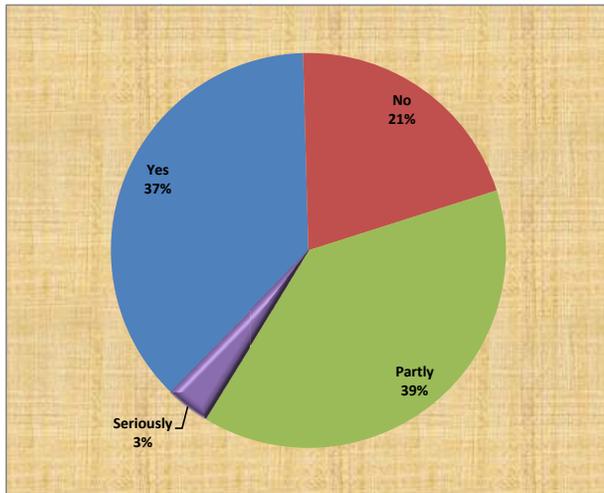
Fig. No.9 shows 33.4 per cent students responded that network problem is both from teacher and student side. 44.2 per cent students are facing problem due to heavy data consumption. About one-third of students (33.8 per cent) are facing problem of concentration, feeling bore to seat before mobile or computer (33.8 per cent) and suffering neck or eye or back pain (35.7 per cent). A sizeable proportion of students (17.4 per cent) of the respondents reported the problem of availability of a device to attend online classes and the time table being implemented not as per the students' convenience.

Fig. No .9.Persistence of Different Problems in Online Classes
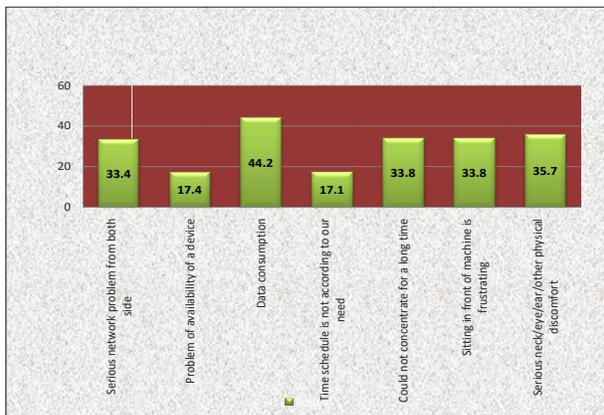
Discussion

The analysis of the activities done by the students and teachers during and after online classes resembles the features of face to face mode approach. Both students and teachers follow all those strategies of teaching and learning what they follow in face to face mode. Teachers prepare PPTs, share with students along with other digital materials and students most often ask questions to teachers after class and prepare the hand notes. Though there is increased use of digital materials instead of hard copy but the content organization and collaborative technology for sharing the works and feedback through digital platforms has not been adequate. The sudden jump from face to face to online classes is being treated as interim measure of teaching in this pandemic. The planning of teaching of an individual teacher and the classes allocated are still based on face to face approach. Though the number of classes has been reduced but the same curricular load still exists with teachers and students. As the content in the units of a paper are inter-linked, teacher delivers the content following simple to complex and there is no scope for blended learning. It is because the teachers have hardly any orientation about online class content organization, pedagogy and digital feedback. Teachers are taking online classes without understanding the underlying principles of self-study and online pedagogy.

There are three categories of students. One group who have understood the benefits of online classes but their number is very few, second group who understood some of the benefits and the third group who are large in number but far away from the understanding of benefits of online classes. Students and teachers rather take it as a temporary arrangement by the institution to continue their study. Students should be guided about the potential benefits of the online classes. Their problems need to be addressed through individual or small group approach. Majority of students responded that online classes lose social learning opportunities. Thus, both teachers and students need orientation on online technologies to make online classes a platform for social learning.

The prominent problem of online classes is serious network problem both with students and teachers; and high rate of data consumption. As the institutions still follow the class time table of the face to face mode, there is provision of continuous class instead of any break in between. Thus, physical discomfort like neck and eye pain is a serious issue. They feel monotonous by seating before mobile phone for hours together and could not concentrate. Thus, all these issues should be taken care of. Teachers should be orientated how to present the topic, how to make

teaching more interactive. They should do some home work for making their teaching plan for online classes and should not always deliver lecture through a PPT. Sometimes, it should be an orientation about a unit, concept sharing by students, designing of assignment, doubt clearing, etc. Teachers can also prepare their own audio or videos lectures on the topic to be taught and share it with students and then organize a doubt clearing class which will be more likely to flipped classroom approach.

The teachers of higher education should focus on how better students can learn the topic instead of how better they can deliver. Teacher should act like a facilitator who will create an environment for student learning. He/she should provide adequate and relevant learning materials to students and motivate students to become autonomous learners. Online classes should be more of counseling where teachers should orient about the topic and clarify students' doubts.

The academic calendar of each institution should be revised in the light of students' need, teachers' expertise and variety of the classes. Institutions should have adequate provision for digital learning equipments and software. Each institution should have own digital space/library for its own students and teachers for easy access. At the state level, pool of resources may be recognized and conduct the class for all the students of the state. Thus, students should be allowed to attend the classes of other institutions. This pandemic has created the opportunity for collaboration and learning from the best teachers. Each institution should organize induction classes for teachers about online pedagogy for effective organization of classes. This will reduce the wastage of time of teachers in shorting out network issues and organizing hardware and software and improve the quality of education and learning.

State should clear its stand whether online class is an alternative to face to face class in this pandemic or a step towards blended learning. If it is blended then a pool of experts should revisit the structure and academic practices of the curriculum. It should be redesigned in the light of blended learning.

The participants of this investigation poorly represent the social categories. This clearly indicates the poor participation of students from ST category. Lack of access to an android set or laptop may be a reason. If the State is thinking of a blended approach, it should also think of creating provision for a free android set or laptop for the students those who could not afford it. It should also think of improving network problems. Wi-Fi zones may also be created in villages and remote locations for free access to students. State Open University and ODL units of conventional universities should lead the process along with experts of face-to-face institutions.

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Education in the Times of COVID-19: Challenges and Responses

Ajit Mondal*

The COVID-19 pandemic in India is part of the worldwide pandemic of corona virus disease 2019 (COVID-19) caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The first case of COVID-19 in India, which originated from China, was reported on 30 January 2020. The outbreak of the pandemic COVID-19 has thrown normal activity into total disorder, leading to governments imposing lockdown in their respective countries. The very unprecedented crisis caused by COVID-19 has impacted every sphere of life and education is one of the worst affected which may have long-lasting effects on society. Most governments around the world have temporarily closed educational institutions in an attempt to contain the spread of the COVID-19 pandemic. According to UNESCO, as on 11th April, 2020, 194 country-wide closures have been impacting over 90.1 per cent of total enrolled learners. 1,578,336,788 learners of the world have been affected. These nationwide closures thus resulted in the closure of over 90 percent of all schools, colleges and universities.

The human, intellectual, physical and material resources available in India need to be mobilized at this juncture to combat against COVID-19. This is also the time to explore the new avenues to cope up with the present crisis caused by the COVID-19. We are to keep in mind the significant statement of the Kothari Commission (1964-66) - "The destiny of India is being shaped in her classroom"**.** Considering the key role of education in building progressive nation, the higher education institutions and faculties have to take the dominant role in exploring possibilities, solutions, way-outs, prospects out of the crisis driven by the COVID-19. They are the chief architects to save the continuity of higher education with resources available, innovations, research and development (R&D) etc. The social accountability and responsibility of higher education also comes normally to lead the nation towards right directions. On the other hand, the Central as well as State Governments must come forward with a bunch of initiatives with proper infrastructural supports, directions and implementation strategies

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during this juncture. The COVID-19 has thus presented a new opportunity for India's higher education system to demonstrate its societal relevance and contributions. This study aims to explore challenges under the ambit of the COVID-19 and where India stands in terms of responses towards digital opportunities in Higher Education in India. Some suggestions have been made to build up a resilient Indian higher education in the times of the pandemic COVID-19.

Indian Higher Education: A Current Profile

India has the third largest higher education system in the world (after America & China). India has reached a gross enrolment ratio (GER) of 26.3 per cent of people going into higher education and is close to achieving a target of 30 per cent by 2020. It has currently more than 993 universities, 39931 colleges with 3.73 crore students and 14.16 lacs (as per AISHE, 2018-19). The Ministry of Human Resource Development has set a target of achieving 32 per cent GER by 2022. Going by the current growth rates, this target is likely to be met in the next few years. India has seen a massive expansion in the higher education sector – an almost four-fold increase in enrolments and institutions since 2001. The increase was primarily driven by privately-owned institutions since the 1990s. Although lower than the global average of 36.7 per cent GER, at 26.3 per cent India compares favourably with other lower middle-income countries with an average GER of 23.5 per cent. The Table – 1 shows the current scenario of higher education in India.

Table – 1: Current Scenario of Indian Higher Education, 2018-19

Universities	993
Universities Located in Rural Area	394
State Private Universities	305
Colleges	39931
Stand Alone Institutes	10725
Students	3.73 Crore
Teachers	14.16 Lacs
Universities are affiliating i.e. having Colleges	298
GER(18-23 Age Group)	26.3%
Ph.D. Awarded (23,765 Males & 17,048 Females)	40,813

Source: AISHE, 2018-19, MHRD

Challenges under the ambit of the COVID-19

Since middle of March, 2020, all colleges and universities in India have been shut down in India to prevent spread of infection of corona virus. Between March and May, higher education system in the country has a very busy schedule every year. Examinations for current students and admissions for new ones are conducted in this period. Many graduating students are appearing for job interviews, and some lucky ones have got offers of employment. But they need certificates and mark-sheets of graduation before they can join take up employment. Understandably, students and their parents are anxious due to sudden and almost un-ending disruptions to their schedule due to COVID-19. The very pandemic has significantly disrupted the higher education sector as well, which is also a critical determinant of a country's economic future. Some problems encountered by public higher education institutions under the COVID – 19 are:

- Sudden preparation of good quality reading material is a matter of concern to a section of teachers who still rely on traditional methods of classroom teaching. The situation may be true in disciplines like Languages, Humanities and Social Sciences, many science-related disciplines too, barring technical education. How would meaningful online teaching be possible in such situations? While most of the students are anxious about uncertain future, most teachers are busy struggling to conduct online classes, with limited digital access, inadequate IT infrastructure and weak competency set. They all will be relieved when this lockdown is over.

- The structure of teaching and learning, including assessment methodologies, is the first to be affected by the COVID-19. Only a handful of institutes are able to continue online teaching-learning process. The low-income private and government institutes, on the other hand, have completely faced acute crisis for not having access to e-learning solutions. In addition to these, the opportunities for availing of the E-Learning among the learners are also subject to economic and social position. Though the faculty have the facilities and intellectual capability to do online teaching, a large number of students don't have such facilities in their rural homes where they have gone back to, following the closure of colleges and universities.

- How can online methods be followed for the conduct of practical classes in disciplines where it is absolutely necessary when students have moved out of campus? For execution of practical classes, laboratory with equipments and materials and teacher's observation–cum-support are highly needed. In the absence of the conduct of practical classes, the conduct of online education would fall flat.

- In the case of technical courses as well as in commerce and management disciplines, students have to do internships with industry as part of course requirements. How would students be fruitfully able to undergo internship when academic institutions and industries are closed due to lockdown? Besides, in case of teacher training courses, the pupil-teachers are not able to undergo internships when schools and training institutes are closed due to lockdown.

- Another important issue which is faced by higher education institutions is how they would make up for the loss of time on account of closure of institutions due to COVID-19. Assuming the mandatory seventy five percent attendance requirement of classes is waived, what would happen to the internal assessment tests, Field Work, Project Work, Tutorial and viva voce examinations which are part of the requirements under the semester system in operation?

- Another major concern is employment. Students those have completed their graduation may have fear in their minds of withdrawal of job offers from the corporate sector due to the current situation. The closure of the job placement wings at institutional level also make them worried about their opportunity in the world of service. The rate of unemployment in India has been increasing day after day due to the pandemic situation. The employment seeking students can realise the gloominess.

- In a country like India, the shift in digital learning might not be the ideal solution as there are many low-income students who do not have access to broadband connectivity and laptops. Even every student here is not tech-savvy or has not access to the high-speed internet and will therefore suffer. When classes actually commence online, many students suffer because of their inability to bear the cost.

Digital Divide – An Area of Concern in India

Today teaching –learning has been possible to deliver in the traditional classrooms but we are to make it possible from home place. Both Teachers and

students have been going through a paradigm shift in platform i.e. Offline to Online in the context of COVID-19. Standing on this transition period, author has tried to share my reflections on the hurdles and barriers which prevent us from participating in online classes universally. Why all the students can't avail of the online classes. What are the basic problems in India? 'Digital divide' is a term that refers to the gap between those who have access to the internet and other digital technologies (Mobile, Television, and Personal Computer) those who do not. Research literature also revealed that more than 80 percent of India's population uses their mobile hotspot for accessing the internet. Out of which, 96 percent of students who used mobile hotspots to gain access to educational resources had problems with internet connectivity.

Table – 2: Digital Divide in India

Internet Density in India	48.4 per cent
Rural India	
Rural Population	66 per cent
Internet Density	25.3 per cent
Urban India	
Urban Population	34 per cent
Internet Density	97.9 per cent

Source: Telecom Regulatory Authority of India, 2019

According to the Report of the Global System for Mobile Communications (GSMA, 2019), Gender is an important factor that shapes digital access. Only 16 per cent of Indian women were found to be using mobile and internet services. On a comparative scale, women were 56 per cent less likely to use mobile internet than men. The 2017-18 National Sample Survey (NSS) reported only 23.8 per cent of Indian households had internet access. In rural households (66 per cent of the population), only 14.9 per cent had access, and in urban households only 42 per cent had access. And males are the primary users: 16 percent of women had access to mobile internet, compared to 36 per cent of men. Young people's access is even less: A recent news report stated only 12.5 per cent of students had access to smart phones.

Until or unless universal access to internet and digital solutions & technological gadgets, in a country like India, the shift in digital learning might not be the ideal solution specially in Rural India as there are many low-income students who do not have access to broadband connectivity and mobiles, computers laptops etc because of their inability to bear the cost. We should ponder the matter seriously. Otherwise, we will witness of an emergence of new social division based digitisation. Online Teaching–Learning System is already on the verge of creating a new social division among the students – Students with Digital Accessibility and Students without Digital Accessibility. Free India is going to give birth of a new social division just like the Lord Macaulay's Minute (1835) gave birth of a new class division – English knowing class and English not knowing class among Indians. Macaulay expressed their hidden motive in his Minute, "We must at present do our best to form a class of persons, Indian in blood and colour, but English in taste, in opinions, in morals and in intellect."

Under these circumstances, if we want to diminish the digital divide, we have to ensure internet access as a human right in India. Already few legal verdicts came in favour of establishing internet access as a fundamental right in India. The internet has morphed from a luxury into a necessity. The Hon'ble Supreme Court of India in *KS Puttaswamy v Union of India* [(2017) 10 SCC 1] remarked that Article 21 of India's Constitution, which protects people's right to life and personal liberty, can be: "… *interpreted to include a spectrum of entitlements such as ... the right to means of communication* …" In September 2019, the Kerala High Court recognised access to the internet as a fundamental right. The High Court held that the right to access the internet falls under India's overarching right to life and liberty and in particular at the intersection of the right to education and the right to privacy. Considering these judgments, we can claim that right to access to internet and technological solutions should be inserted in the Article 21 (right to life) and Article 21A (right to education). Without access to education and access to internet with solutions, meaning of life cannot be fruitful. Government should zero rejection policy in this paradigm shift in education sector. It is high time to take precautionary measures as India is now in the budding stage of digital transformation in education sector. If we examine the current position of India in the domain of digital transformation in education sector, India stands in the beginning stage. There are mainly three stages for complete transformation -

1) India is currently in STAGE 1 of the transition from face-to-face learning to online education, where classes have begun to be taken online.

2) STAGE 2 of this transition is where there is

"100 percent course delivery online (assessment, grading)" and

3) STAGE 3 is where there is "complete delivery of course credit online (online degrees)."

Major Digital Initiatives at National Level

- National Mission on Education through Information and Communication Technology (NMEICT), 2009 has been started as a Centrally Sponsored Scheme to leverage the potential of ICT, in teaching and learning process for the benefit of all the learners in Higher Education Institutions in any time any where mode.

- National Policy on ICT in School Education, 2013 aims at preparing youth to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socioeconomic development of the nation and global competitiveness.

- Digital India was launched by the Prime Minister of India on 1 July 2015, with an objective of connecting rural areas with high-speed Internet networks and improving digital literacy. Digital India is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy.

- India has a remarkable diversity in terms of languages written and spoken in different parts of the country. There are 22 official languages and 12 scripts. Knowledge of English is limited to a very small section of the population in the country. The rest often cannot access or comprehend digital resources which are available mainly in English. To overcome this barrier the Government is formulating a new mission mode project named as e-Bhasha (National Digital Literacy Mission, 2014) to help develop and disseminate digital content in local languages to India's largely non-English speaking population. National Digital Literacy Mission ('NDLM') has been initiated with the vision to empower at least one person per household with crucial digital literacy skills by 2020. With the social inequity in online education coming to the fore due to the COVID-19 pandemic, the Centre has proposed long-term measures on 30th June, 2020 to bridge the divide, including plans to distribute laptops or tablets to 40 per cent of all college and university students over the next five years, and to equip all government schools with information and communication technology.

Digital Opportunities in Higher Education

The Government of India as well as different higher education institutions has so many digital platforms to maintain the continuity of higher education in India. These are:

- ***Massive Online Open Courses (MOOCs) Platforms in India*:** The MOOCs platforms in India are SWAYAM, National Programme on Technology Enhanced Learning (NPTEL), mooKIT (IIT Kanpur) and IIT Bombay X (IITBX). In order to ensure that best quality content is produced and delivered, nine National Coordinators have been appointed by the MHRD. They are:

1) **AICTE** (All India Council for Technical Education)

2) **NPTEL** (National Programme on Technology Enhanced Learning)

3) **UGC** (University Grants Commission)

4) **CEC** (Consortium for Educational Communication)

5) **NCERT** (National Council of Educational Research and Training)

6) **NIOS** (National Institute of Open Schooling)

7) **IGNOU** (Indira Gandhi National Open University)

8) **IIMB** (Indian Institute of Management, Bangalore)

9) **NITTTR** (National Institute of Technical Teachers Training and Research)

SWAYAM is India's own MOOCs platform offering online courses on all disciplines viz. Engineering, Law, Management, Humanities & Social Sciences and Professional Courses. SWAYAM**,** a Government initiative has laid a web-based platform for learners from class IX to Post-Graduate (PG) to have access to courses prepared by some of best teachers and delivered free of cost. Till today SWAYAM houses a repository of 1900 courses , 50 thousand learners have already accessed and 25 lacs students have already enrolled the January 2020 Semester 2020. 82 UG and 42 PG MOOCs Courses have been approved by the SWAYAM Board for the July Semister, 2020. 82 UG and 42 PG MOOCs Courses have been approved by the SWAYAM Board

for the July – December Semester, 2020. However, for certification the learners need to appear for examination and pay certain fees and selected courses also offer credit transfer after successful completion of a course. As per the Guidelines for Developing Online Courses for SWAYAM (MHRD, 2017), the courses hosted on SWAYAM are in 4 quadrants –

a) Video lecture,

b) Specially prepared reading material that can be downloaded/printed

c) Self-assessment tests through tests and quizzes and

d) An online discussion forum for clearing the doubts.

UGC has already issued the UGC (Credit Framework for Online Learning Courses through SWAYAM) Regulation 2016 advising the Universities to identify courses where credits can be transferred on to the academic record of the students for courses done on SWAYAM. List of Universities Approved Credit Transfer (Total 141). The National Programme on Technology Enhanced Learning (NPTEL) has recently undertaken an initiative on translation of the course Content into Regional Languages. In India there are 22 languages, which have been referred to as Scheduled Languages. 96.71 percent of the population in the country has one of the 22 Scheduled Languages as their mother tongue. NPTEL has initiated translation of course content in 8 different languages (Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Tamil and Telugu as their mother tongue. Translation of NPTEL content will assist students in more effectively utilizing the best technical content in the country. The Translation of the remaining 8 National Coordinators of MOOCs or any other three platforms have not yet started course content in regional languages.

All India Council for Technical Education (AICTE) has also offered 49 Free E-Learning Courses for our beloved students. Many companies came forward to give their products free of cost for those who register till 31st May 2020 for your learning. AICTE does not take any responsibility for its contents nor copyright issues, if any, since the products are not vetted by AICTE. It's the responsibility of respective company.

- **Shodh Shudhhi**: The MHRD, Govt of India has initiated a programme "Shodh Suddhi" which provides access to Plagiarism Detection Software (PDS) to all universities/Institutions in India since September 1, 2019. Under this initiative, **URKUND a Web Based Plagiarism Detection Software System** is being provided to all Users of universities/Intuitions in the country.

- *National Digital Library of India (NDL India)* provides a framework of virtual repository of learning resources with a single-window search facility. Association of Indian Universities (AIU) has recently collaborated with National Digital Library (NDLI), developed by IIT Kharagpur for pooling all online resources in National Digital Library and for extending it to students. Since many Institutions and academicians are creating online content during this time, they are also requesting for contributions for original content to NDLI.

- *Swayam Prabha* is an initiative to provide 32 high quality educational channels through DTH (Direct to Home) to deliver high quality educational based course content covering diverse disciplines in a most cost effective & inclusive manner. e-PG Pathshala is a gateway for e-books up to PG. Get free books and curriculum-based e-content

- *e-Content Courseware in UG Subjects*: e-Content in 87 Undergraduate courses with about 24110 e-content modules is available in the Consortium for Educational Communication (CEC) website at http://cec.nic.in. CEC-UGC You Tube Channel provides access to unlimited educational curriculum based lectures absolutely free.

- *VIDWAN* is the premier database of profiles of scientists / researchers and other faculty members working at leading academic institutions and other R & D organisation involved in teaching and research in India. It provides important information about expert's background, contact address, experience, scholarly publications, skills and accomplishments, researcher identity, etc. The database would be instrumental in selection of panels of experts for various committees, taskforce, established by the Ministries / Govt. establishments for monitoring and evaluation purposes. Its Objectives are mainly.

a) Quickly and conveniently provide information about expert to peers, prospective collaborators, funding agencies policy makers and research scholar in the country

b) Identify peer reviewers for articles and research proposal

c) Discover prospective collaborators for on-going research projects

d) Establish communication directly with the experts who possess the expertise needed by users

e) To create information exchanges and networking opportunities among scientists

- *Shodhganga*: A reservoir of Indian Theses Access Research Theses of scholars of Indian Institutes. **e-ShodhSindhu**: e-journals Get access to full text e-resources

- *e-Yantra*: It enables the effective education across engineering colleges in India on embedded systems and Robotics in collaboration with IIT Bombay. This initiative by IIT Bombay aims to create the next generation of embedded systems engineers with a practical outlook to help provide practical solutions to some of the real world problems.

- *Virtual Labs*: provide remote-access to Labs in various disciplines of Science and Engineering, implemented by IIT Delhi. Web-enabled experiments designed for remote – operation.

- *The DIKSHA Platform*: offers teachers, students and parents engaging learning material relevant to the prescribed school curriculum. Teachers have access to aids like lesson plans, worksheets and activities, to create enjoyable classroom experiences. Students understand concepts, revise lessons and do practice exercises. Parents can follow classroom activities and clear doubts outside school hours.

The Way Forward

Needless to say, the pandemic has transformed the centuries-old, chalk–talk teaching model to one driven by technology. This disruption in the delivery of education is pushing policymakers to figure out how to drive engagement at scale while ensuring inclusive E-learning solutions and tackling the digital divide. We can't ignore that technology plays a crucial role in the educational system and the demand for the current situation is this only. A multi-pronged strategy is necessary to manage the crisis and build a resilient Indian education system in the long term. The pandemic has several social science and inter-disciplinary & trans-disciplinary dimensions apart from the medical science and drug discovery. These social science dimensions can improve our understanding of the outbreak and response at global, national and sub-national levels as social science context can throw greater light on dynamics of spread and transmission, public health response, communication and sensitisation about the problem and required health and hygiene practices, societal understanding of the disease and related risks, preparedness and interventions, political preparedness, economic and livelihood implications of such pandemic. The research based evidence on social science or inter-disciplinary dimensions could enrich the understanding of policy makers to take a more a more informed decision and respond efficiently to such situations. Considering this, Indian Council of Social Science Research (ICSSR) has already decided to come out with "Special Call for Studies Focusing on Social Science Dimensions of COVID-19 Coronavirus Pandemic". The UGC should also encourage such researches among the faculties in higher education institutes on a large scale. Besides these, few suggestions have been put forward towards the paradigm shift from off-line to online mode in Indian higher education domain. These are:

- Right to Access to Internet and Digital Tools as A Human Right has to be established and it should be connected with Article 21 & Article 21A under the Constitution of India. With the help of power supply, digital skills of teachers and students, internet connectivity it is necessary to explore digital learning, high and low technology solutions, etc.

- Budgetary allocation should be increased in education and healthcare sectors. At least 6 per cent GDP will be allocated in education as soon as possible. Only the education can recover the loss and ensure the continuity of higher education.

- Open-source digital learning solutions and Learning Management Softwares/Solutions (LMSs) should be adopted so teachers can conduct teaching online.

- Further, it is also important to establish quality assurance mechanisms and quality benchmark for online learning developed and offered by Indian higher education institutes as well as e-learning platforms (growing rapidly). Many e-learning players offer multiple courses on the same subjects with different levels of certifications, methodology and assessment parameters. So, the quality of courses may differ across different e-learning platforms.

- The courses on Indian traditional knowledge

systems in the fields of yoga, Indian medicines, architecture, hydraulics, ethno-botany, metallurgy and agriculture should be integrated with a present-day mainstream university education to serve the larger cause of humanity. Courses like Physical Education and Creative Arts are conducted online in various parts of the world. Teachers use online tools to monitor the students and conduct classes.

- In this time of crisis, a well-round and effective educational practice is what is needed for the capacity-building of young minds. It will develop skills that will drive their employability, productivity, health, and well-being in the decades to come, and ensure the overall progress of India. Measures should be taken to mitigate the effects of the pandemic on job offers, internship programs, and research projects.

- The pandemic and sudden lockdown has created a sense of panic, fear and isolation amongst people. There is a need to provide help, help-lines, counselling and other support services to many who are facing mental stress and related anxieties today. Special attention to women and children may be necessary, since new conditions for abuse and harassment may have arisen.

- The human, intellectual, physical and material resources available in our system need to be mobilized at this juncture. Capacity building of faculty through online workshops needs to equip them to deliver online education. Sensitization programmes need to enable a shift in mindset towards online teaching and learning among the teachers & students. Teachers should have to make coordination among Content Knowledge, Pedagogical knowledge and Technological Knowledge at the time of delivery.

- Open and Distance Learning (ODL) Programmes should be can be introduced in each public university. To explore digital learning platforms more and more and number of digital library should be increased and make them easy accessible and well – equipped with current books and open access journals.

- Draft National Education Policy, 2019 should be revised in line with the emerging needs and conditions under the ambit of the pandemic.

- The G Suite Basic and G Suite for Education allow the host to invite 100 participants to a live video conference. Those platforms affiliated with Google can be accessed through G Suite Enterprise for Education and it can invite a greater number of participants. Google Meet, Hangouts Meet, and Google Classroom (video conferencing & classroom management apps) are developed by Google. Each institution as an unprofitable organization can get access free of cost.

- The UGC should approve all the public universities to transfer credit of the MOOCs developed and conducted by the MHRD. Content in the MOOCs in all regional languages at school level, UG & PG levels should be initiated soon. Access to Scopus and Web of Science indexed E-Journals and E-Books must be available to all the students and teachers at institutional level for the promotion of research and development (R&D).

- Universities and Colleges should redesign curriculum of current courses to introduce a component of field study on the post COVID-19 situation in the communities and neighbourhoods. They should also undertake analysis of loss of employment and livelihood due to pandemic and teachers have to explore locally appropriate solutions for sustainable livelihoods. Institutions can start widespread multidisciplinary Short Term Courses or Certificate Courses on public health practices and situations in such communities (both rural and urban) in partnership with local communities.

- Digital citizenship is how a person should act while using digital technology online. The term is often mentioned in relation to Internet safety and netiquette. The Internet is fast emerging as a learning space for our students and it's our responsibility as educators to provide them with a safe learning environment.

Concluding Remarks

The outbreak of the pandemic COVID-19 has impacted every sphere of life and education is one of the worst affected which may have long-lasting effects on society. The human, intellectual, physical and material resources available in India need to be mobilized at this juncture to combat against COVID-19. This is also the time to explore the new avenues to cope up with the present crisis caused by the COVID-19. The higher education institutions have to take the dominant role in exploring possibilities, solutions, way-outs, prospects out of the crisis driven by the COVID-19. They have to save the continuity of higher education with resources available, innovations, research and development (R&D) etc. We can't but

accept the crucial role of technology plays in such situation. It is also important to reconsider the current delivery and pedagogical methods in school and higher education by integrating classroom learning with e-learning modes to build a unified learning system. Teachers will also have to perform as the chief architect in the paradigm shift. In a nutshell, a multi-pronged strategy is necessary to manage the crisis and build a resilient Indian education system in the long term. Time never waits; this hard time will also pass. Till then stay safe, stay at home! The higher education sector is also a critical determinant of a country's economic future. Naturally a multi-pronged strategy is necessary to manage the crisis and build a resilient Indian education system in the long term. In this context, the emerging role of teachers, administrators, students and researchers come forward under the current crisis. An Innovative Teaching and Leadership Consultant, George Couros says, *"Technology can never replace great teachers, but technology in the hands of great teachers is transformational."*

Acknowledgment

Conflict of Interest

Author has no conflict of interest and present article is prepared on the basis of information available in public domain with my own reflections.

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There is No Substitute for Good Health

Ram Nath Kovind, Hon'ble President of India delivered the Convocation Address at the 7ᵗʰ convocation of Ceremony of Institute of Liver and Biliary Sciences (ILBS) on New Delhi January 15, 2020. He said, "Health remains a key development challenge for India. Our Government remains committed to tackle these through the flagship Ayushman Bharat programme and other health missions. To me, the most crucial element in addressing our health challenges is our medical fraternity. Doctors and other medical professionals are the backbone of a robust health infrastructure and you have the onerous task of updating your own knowledge and skills all the time." Excerpts

I am delighted to be present amongst all of you today on the occasion of the Tenth Foundation Day of the Institute of Liver and Biliary Sciences (ILBS) and the Seventh Convocation Ceremony of the Institute. The day becomes even more special as it coincides with all of us celebrating Makar Sankranti today. My best wishes to all of you on this day. It appears that ILBS has a divine association with Makar Sankranti. I am told that ten years ago too, it was on Makar Sankranti, that this institute was born and since then it has grown from strength to strength.

I am pleased to know that in a short span of ten years, ILBS has made a stellar contribution in the field of liver and biliary diseases and has earned immense appreciation for its academic excellence. It has served people in need with state-of-the-art patient care services at an affordable cost. I congratulate all member of the ILBS family, both past and present, whose dedication and commitment lies behind the Institute's success.

Ten years in the life of an institute is an apt occasion to reflect upon its successes as well as its present and future challenges. There is no doubt that ILBS has lived upto its vision to be a centre of excellence for diagnosis, cure and prevention of liver and biliary diseases. Since inception, ILBS has served over seven lakh patients and set benchmarks for evidence and protocol based treatments. As we just heard from the Director, ILBS has laudable and Biliary Sciences.

Ladies and Gentlemen,

There are still numerous health challenges before us all, including those related to Liver diseases. In India, we need about two lakh liver transplants a year, while only a few thousand are done every year. There is need to establish liver transplant programs in more public hospitals and ILBS can provide necessary expertise in this regard. But perhaps most crucial is to encourage organ donation and spread awareness about it. There is a huge gap between the requirement and availability of organs needed for saving lives. Organ donors give a new lease of life to fellow human beings and in a way they continue to live even after their death.

The dearth of donors results mainly from lack of awareness about organ donation. I urge ILBS to prepare a roadmap suggesting ways and means to encourage Liver donation, to improve the related procedures and protocols, and to strengthen the infrastructure needed to support a higher number of Liver transplants than is currently possible. Once prepared, the roadmap can be shared with different stakeholders.

The growing incidence of Liver diseases is also linked to our unhealthy lifestyles. I am told that, at present, nearly one out of four Indians have fatty liver and may be ten per cent of them have liver diseases due to excessive body fat. This condition is known to be a precursor to development of diabetes and heart disease. And diabetics have greater incidence of liver disease than others. It is for institutes like ILBS to take up research that can clarify the linkages between our lifestyle and liver diseases. That would help in developing a preventive care system based in lifestyle changes.

There is no substitute for each of us taking more responsibility for our health and that of our children. We should try to make yoga, physical exercises, sports and meditation an integral part of our daily routine. I often hear people complaining that children nowadays remain glued to their TV screens, tablets and mobile devices rather than playing outdoor sports. It is for us to counsel them on the adverse effects of long exposure to digital screens and motivate them to take the playing fields.

Ladies and Gentlemen,

Health remains a key development challenge for India. Our Government remains committed to

tackle these through the flagship Ayushman Bharat programme and other health missions. To me, the most crucial element in addressing our health challenges is our medical fraternity. Doctors and other medical professionals are the backbone of a robust health infrastructure and you have the onerous task of updating your own knowledge and skills all the time.

In this context, on the occasion of the Institute's Seventh Convocation, let me congratulate all the specialists, who have completed their courses here at ILBS in the niche area of liver disease. Your success is a result of your hard work, as well as the efforts of your professors and the sacrifices of your families. With your specialized knowledge, you now have an even greater power to help those in need. And for you, there cannot be a better example of service than the late Dr. A P J Abdul Kalam, former President of India, who was the first Chancellor of this institute where you have been trained.

Through your education at ILBS, you have enhanced your capabilities to serve fellow human beings. It is true that you need to be legitimately rewarded for your academic excellence, your available both to those who can afford your fees and also to those who are less fortunate and cannot afford. I am sure each one of you will find your own ways to make this possible.

I compliment the Director, Dr. S. K. Sarin, his entire team, students and all others who have been associated with ILBS in past, for the Institute's glorious journey of ten years. I am sure the Institute shall continue its excellent work in delivering quality public health services. I wish the Institute and all of you the very best for your future endeavours.

Thank you,
Jai Hind!

CAMPUS NEWS

Virtual National Conference on Open and Distance Learning

A two-day Virtual IDEA-IDOL-CEMCA National Conference on 'Emerging Perspectives of Open and Distance Learning' was organized by the Institute of Distance and Open Learning (IDOL), University of Mumbai to celebrate the 50th year of IDOL in association with Indian Distance Education Association (IDEA) and Commonwealth Educational Media Centre for Asia (CEMCA) during July 17-18, 2020. The conference was organised to bring together different institutions and individuals engaged in various activities relating to ODL within the country to share their ideas, information and experience on Quality Assurance in open and distance education. About 1000 participants registered for the event. Total 90 papers were received from different stakeholders expressing their ideas and viewpoints on ODL and around 64 papers were presented in the online event. All the valuable insights gave us a new perspective that one should adopt while discussing the issues related to Open and Distance Learning. There were in-depth discussions and communications on 15 major topics related to Emerging Perspectives of Open and Distance Learning.

During Inaugural Session, Prof. Nageshwar Rao, Vice Chancellor of Indira Gandhi National Open University, New Delhi and Dr. Avichal Kapur, Joint Secretary, UGC DEB discussed the 'Role of ODL in the Post-pandemic Era' and the 'Work of Distance Education Bureau in Policy Formulation for the Country', respectively. Dr Madhu Parhar, Director, CEMCA spoke about the activities of its organisation. The presidential remarks was given by Professor Suhas Pednekar, Vice Chancellor, University of Mumbai who explained the role of ODL teachers in these trying times and the correct approach that needs to be implemented in the present situation. An edited volume with 31 papers presented in a national conference in celebration of 50th year of ODL in India in 2012 entitled 'Understanding of ODL in Dual Mode Universities of India' was also released. The IDEA Annual Conference has the practice of organising two Memorial Lectures in the name of Prof G Ram Reddy and Prof Bakhshish Singh. This year's Prof G Ram Reddy memorial lecture was delivered by Dr Satish

Rastogi, formerly with YCMOU on 'Quality Assurances in ODL' while Prof Bakshish Singh Memorial Lecture was delivered by Dr Ravi Mahajan, University School of Open Learning, Punjab University, Chandigarh on 'SWAYAM as a Revolution'.

The Technical Sessions, panel Discussion and Memorial Lectures were chaired and conducted by the eminent personalities in the field of ODL like Prof. Seetharam Rao, former Vice Chancellor, Dr. B.R. Ambedkar Open University, Hyderabad, Dr. E Vayunandan, Vice Chancellor, Yashwantrao Chavan Maharashtra Open University, Nashik, Dr. Madhulika Kaushik, Pro Vice Chancellor, Usha Martin University, Ranchi, Prof V N Rajasekharan Pillai, Vice Chancellor, Somaiya Vidyavihar University, Mumbai, Maharashtra, Dr G Laxma Reddy, Registrar, Dr. B.R. Ambedkar Open University, Hyderabad, Dr S Jeelani, Director, Center for Digital and Virtual Learning, University of Hyderabad, Dr. R Satyanarayan, Director, STRIDE, Indira Gandhi National Open University, New Delhi, Dr Mushtaq Patel, Registrar, Central University of Karnataka, Kalaburagi. Each of the sessions were enriching, eye opening and motivating.

In the Valedictory Session, the Chief Guest was Prof. Dr. Ebba Ossiannilsson, Member, EC of International Council for Open and Distance Education (ICDE), Chair, ICDE OERAC and Swedish Association for Distance Education, who not only expressed her passion for ODL but also shared her priceless knowledge that added a special beauty to the sensation. She spoke about the International Council for Open and Distance Education and Open Educational Resources. She also greeted the University of Mumbai on its 164th Foundation Day on 18th July and IDOL on its march towards 50th Anniversary.

Dr. (Mrs) Pankaj Mittal, Secretary General, Association of Indian Universities, New Delhi graced the occasion as the Guest of Honour for the Valedictory Ceremony. Dr. Pankaj Mittal shared her profound knowledge about the emergence of e-PG Pathshala project of UGC and subsequently the Massive Open Online Courses through SWAYAM portal and her speech was full of zeal and valuable information for

the teachers as she spoke about the techniques of facing the camera while recording video lectures.

The special merit awards were presented to the academicians who, during their lifetimes, have made contributions of outstanding significance to the field of Open and Distance Learning. The *Lifetime Achievement Award* in the field of ODL was awarded to Organising Secretary, Dr. Dhaneswar Harichandan of IDOL. The Award for *Achievements as Open and Distance Learning Administrator* was awarded to Dr. Ami U. Upadhyay, Vice Cnancellor, Dr. Babasaheb Ambedkar Open University, Ahmedabad, Gujarat. The *Ideal Distance Education Adult Learner (IDEAL)* award by IDEA was awarded to a senior distance learner, Mr. Binay Kumar, PhD Scholar of STRIDE, IGNOU who has crossed the age of 80 years and yet continues to motivate all of us through the dictum 'learning continues throughout the life'. The *Best Paper Presentation Award* was awarded to three selected paper presenters: Mr. Prakash Ignatius Almeida for his paper on 'The Imperative of Cognitive Shift for making Students Effective Autonomous Self Learners for DE', Ms Pooja Kulkarni on 'A study conducted on Awareness of the term Spiritual Intelligence and Usage of AI', and Dr V V Kanak Durga on 'A Survey of Counsellors Attitudes on Motivating Open and Distance Learners'.

The Pro Vice Chancellor of University of Mumbai, Professor Ravindra Kulkarni shared his valuable insights while delivering the presidential remarks. The conference proceedings entitled 'Emerging Perspectives of ODL' Volume 1 was also released. The deliberations focussed on analysing the general situation and existing problems of Open and Distance Learning but also introduced advanced experiences from home and abroad, exchanged ideas on cutting-edge theories and major practices of ODL, and proposed many constructive ideas and suggestions on more efficient, more balanced and more sustainable development in the field of e-learning. The Vote of Thanks was proposed by the Secretary General, IDEA, Dr Romesh Verma.

Virtual International Conference on Geopolitics in Post-COVID Era

A two-day Online International Conference on 'Geopolitics in Post-Covid Era: Emerging Dimensions and Dynamics is being organised by UGC- Human Resource Development Centre (Academic Staff College), Osmania University, Hyderabad, Telangana in collaboration with Hyderabad Institute of Social Sciences (HISS) during September 11-12, 2020.

COVID-19 pandemic has put an unimaginable challenge to the human existence on the planet. It has caused wide spread disruption in all the existing systems. The developed countries including those superpowers have got severely affected and are reeling under the negative impact of the Covid-19 on their economies, health systems and many other areas. The world leaders, scientific community and intelligence agencies are fighting over the origin and the spread of the novel virus and are frantically striving for the remedies like the development of vaccine and treatment. Is it a failure of world leadership or human scientific concern? Across the world including the United States are trying to curb the economic, social and geo-political consequences of this pandemic by providing relief measures for their economies. In anticipation to the public health crisis, countries across the world have closed their borders in order to prevent the spread of the deadly virus and protect themselves from the ill effects of the pandemic. The World Health Organization has already warned the pandemic induced crisis of the public health that we face today will inevitably become an economic crisis in the days to come. On the other hand it may be a threat to the national security as well.

The other side of the coin, COVID-19 pandemic seems as a 'make or break' challenge for the EU. The Member countries of the EU have been most affected by the devastating consequences of the corona virus which leads to the dwindling of solidarity among them. Other countries have called upon for more effective coordination through NATO, G-7 and G-20 etc. It can be said that corona virus is resulting in the new crop of instabilities that potentially has the power to rearrange the current geo-political arena and create new power blocks and shift the balances and consequently helps in forging new alliances and creating new enemies. The COVID-19 pandemic throws a new light on the balance of power and redefines the geopolitics of Asian, European and other western countries with special reference to the relations between the two economic giants China and US. The traditional geopolitical frameworks focus

on the hard capacities of the countries to analyze the consequences of an unexpected event, even as the impact of the COVID-19 pandemic on the global economy is more dramatic than any other shock in the recent times. A radical shift in the global political economy may be imminent in the post-COVID-19 world affairs. The Corona virus crisis is changing the global dynamics of power and also where India stands in the newly emerging global pecking order depends on the relevance of what it has to offer and what is its role in the post COVID World. The Subthemes of the event are:

- Geopolitical Implications.
- Mapping a Pandemic: The Geopolitics of Corona Virus.
- International Diplomacy.
- Geo-economics and Ongoing Dynamics.
- Economical, Social and Political Concerns.
- Environmental Challenges.
- Scientific and Human Potentials.
- Vaccine Wars.
- Military and Security Issues.
- Role of the Fourth Estate.
- Implications for Global Order.
- Policy Recommendations.

For further details, contact Organising Secretary, UGC-Human Resource Development Centre (Academic Staff College) Osmania University, Hyderabad-500007-Telangana, Mobile No: +91 9346311388, +91 89191 53753, E-mail: *hisshyderabad@gmail.com* and *chalamallavenkateshwarlu@osmania.ac.in.* For updates, log on to: *www.osmania.ac.in*

International Conference on Advances in Sustainable Technologies

A two-day International Conference on 'Advances in Sustainable Technologies' is being organised by the School of Mechanical Engineering under the aegis of Lovely Professional University, Phgawara, Punjab during November 06-07, 2020.

Globalization provides all-around development and this development is impossible without technological contributions. Hence, the event aims at providing a leading forum for sharing original research contributions and practical developments in the field of Mechanical Engineering so as to contribute its share for technological advancements. The Topics of Interest are:

Sustainable Materials and Manufacturing

- Materials Science and Engineering.
- Materials Property and Characterization.
- Materials Applications, Performance, and Life Cycle.
- Ferrous and Non-Ferrous Materials.
- Materials for Photoelectric Devices.
- Composites.
- Micro / Nano Materials.
- Ceramics and Glasses.
- Feature Engineering Polymers.
- Magnetic/Non-Magnetic Materials.
- Biomaterials.
- Smart/Intelligent Materials
- Polymeric Materials
- Thin Films
- Active polymers, materials, and actuators
- Energy Storage Materials and Energy Harvesting
- Modelling and Simulation for Sustainability
- Computing in Applied Mechanics.
- CAD/CAM/CIM/HVAC/CAE and Product Design.
- Dynamics and Control of Structures/ Systems.
- Fracture and Failure Mechanics.
- Solid Mechanics: Differential/Dynamical Systems.
- Modeling and Simulation.
- Artificial Intelligence: Fuzzy Logic, Neural Network, Genetic Algorithm, etc.
- Finite Element Analysis.
- Advanced Numerical Techniques.
- Advancements in Tribology.
- Nano-mechanics and MEMS.
- Modeling, Analysis, and Simulation of Manufacturing Processes.
- Multi-objective Optimization.
- Applications of Mathematical Modeling and Optimization Theory and Methods.

- Other Related Topics.

Sustainable Energy and Environment

- Conventional and Non-conventional Energy Resources.
- Energy Storage.
- Energy Policy, Economics, Management.
- Industrial Advancements in Energy Systems.
- Nano-Fluids.
- HVAC Systems.
- Alternative Fuels.
- Renewable Energy.
- Particulate Materials and Air Pollution.
- Air Pollution Control and Air Quality.
- Surface/Ground Water Pollution Control.

Sustainable Industry Challenges

- Industry 4.0.
- JIT, MRP, Supply Chain Management and Logistics.

- Intelligent Manufacturing System.
- Rapid Prototyping and Reverse Engineering.
- Time and Motion Study.
- Quality Control and Reliability.
- Productivity Improvement.
- Operational Research.
- Six Sigma.
- Ergonomics.
- Joining Processes.
- Smart Manufacturing.
- Advanced Manufacturing and Processing Technology.
- Supply Chain.

For further details, contact Organizing Chair, Lovely Professional University, Phagwara- 144 411, Punjab, E-mail- *icast@lpu.co.in*. For updates, log on to: *www.lpu.in*.

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THESES OF THE MONTH

SCIENCE & TECHNOLOGY

A List of doctoral theses accepted by Indian Universities
(Notifications received in AIU during the month of April-May, 2020)

BIOLOGICAL SCIENCES

Biochemistry

1. Bansal, Poonam. **Phenotypic, biochemical, molecular and in silico characterization of** *pediococcus acidilactici*. (Dr. Suman Dhanda), Department of Biochemistry, Kurukshetra University, Kurukshetra.

2. Priyanka, B S. **Integrated approach for the downstream processing of enzymes involving liquid emulsion membrane**. (Navin K. Rastogi), Department of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

3. Raman Kumar. **A Study of plasmid and metabolic profiling of pediococcus acidilactici: A potential biotherapeutic agent**. (Dr. Suman Dhanda), Department of Biochemistry, Kurukshetra University, Kurukshetra.

Biotechnology

1. Borah, Rajib. **Development of protocol for in vitro culture and micropropagation of** *magnolia punduana* **(Hook F& Thomson) Figlar: A threatened plant of Meghalaya**. (Dr. Hiranjit Choudhury), Department of Biotechnology & Bioinformatics, North Eastern Hill University, Shillong.

2. Rynjah, Carey Vana. **Studies on the effect of anti-diabetic plants on adenosine Monophosphate-activated Protein Kinase (AMPK)-regulated metabolism in diabetic and obese mice**. (Dr. S Majaw and Prof. D Syiem), Department of Biotechnology & Bioinformatics, North Eastern Hill University, Shillong.

Botany

1. Khonglah, Deehunkimin. **Antagonistic effects of rhizospheric fungal isolates against phytopathogens of** *Solanum lycopersicum* **L**. (Prof. H Kayang), Department of Botany, North Eastern Hill University, Shillong.

2. Meenu. **Studies on glyphosate induced toxicity in ovarian antral follicles of goat (***Capra hircus***)**. (Dr. Jitender Kumar Bhardwaj), Department of Botany, Kurukshetra University, Kurukshetra.

3. Pandey, Atul Kumar. **Microfungi from the forest flora of South Sagar Forest Division: A mycotaxonomic survey and study**. (Prof. A N Rai), Department of Botany, Dr Harisingh Gour Vishwavidyalaya, Sagar.

4. Parul. **Floristic diversity of plains of Yamuna Nagar District (Haryana)**. (Dr. B. D. Vashistha), Department of Botany, Kurukshetra University, Kurukshetra.

5. Rao, Suhana. **Physiological studies on the effect of potassium in sweet corn (Zea Mays L.) under water deficit**. (Dr. Narender Singh), Department of Botany, Kurukshetra University, Kurukshetra.

6. Rore, Vineshsingh Gulabsingh. **Studies on contemporary frame work and innovative modeling for utilization of biomass resources as climate change mitigation tool**. (Dr. Himanshu A Pandya), Faculty of Science, Gujarat University, Ahmedabad.

Genetics

1. Parmar, Rajni. **Next generation genomic studies for identification of key regulators and genome wide nucleotide variations for drought dissection in Tea (***Camellia sinensis* **(L.) O Kuntze)**. (Dr R.K. Sharma), Faculty of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

Life Science

1. Pillalamarri, Vijaykumar. **Structural, biochemical and inhibition studies of methionine aminopeptidases**. (Dr. Anthony Addlagatta), Faculty of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

2. Rao, Srisha N. **Structure-(re)activity study of photosensitizers and drug molecules**. (Dr G. Narahari Sastry), Faculty of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

Marine Science

1. Tanna, Bhakti. **Non-targeted metabolite profiling of selected seaweeds along the Gujarat Coast**. (Dr Avinash Mishra), Faculty of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

Zoology

1. Priya Kumari. **Studies on cypermethrin induced toxicity in testicular germ cells of goat (***Capra hircus***)**. (Dr. Abhay Singh Yadav and Dr. Jitender Kumar Bhardwaj), Department of Zoology, Kurukshetra University, Kurukshetra.

ENGINEERING SCIENCES

Chemical Engineering

1. Maheshwari, Pankaj Kumar. **Growth and superconductivity of pure and doped iron chalcogenides**

single crystals. (Dr. V P S Awana), Faculty of Engineering Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

2. Ray, Bhumika. **Binding mechanism of anticancer flavonoids and their derivatives with nucleic acid**. (Dr. Ranjana Mehrotra), Faculty of Engineering Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

Civil Engineering

1. Varinder Kumar. **Experimental design of concrete mix proportioning using some industrial by-products**. (Dr. Prem Pal Bansal, Dr. Maneek Kumar andDr. Ajay Batish), Department of Civil Engineering, Thapar Institute of Engineering and Technology, Patiala.

Computer Science & Engineering

1. Ahmed, Syed Sazzad. **Inference and analysis of gene regulatory networks using data mining techniques**. (Dr. Swarup Roy and Dr. Md Iftekar Hussain), Department of Information Technology, North Eastern Hill University, Shillong.

2. Bhatia, Amandeep Singh. **On some aspects of quantum computational models**. (Dr. Ajay Kumar), Department of Computer Science & Engineering, Thapar Institute of Engineering and Technology, Patiala.

3. Chawda, Bharatkumar Vikrambhai. **Applying natural computing to stock market portfolio management**. (Dr. Jayeshkumar M Patel), Department of Computer Science & Engineering, Gujarat Technological University, Ahmedabad.

4. Chyne, Phidahunlang. **Leveraging the communication in intelligent transportation system by combined wireless technologies**. (Dr. Debdatta Kandar), Department of Informational Technology, North Eastern Hill University, Shillong.

5. Goel, Shubham. **Personalization of web search using social information**. (Dr. Ravinder Kumar), Department of Computer Science & Engineering, Thapar Institute of Engineering and Technology, Patiala.

6. Pradhan, Anita. **Image steganography techniques based on adaptive pixel value differencing and exploiting multi-directional edges**. (Dr. K Rajasekhar), Department of Computer Science & Engineering, Koneru Lakshmaiah Education Foundation, Guntur.

7. Sukhdev Singh. **Multimodal biometric framework security using Finger Knuckle Print and Iris**. (Dr. Chander Kant), Department of Computer Science, Kurukshetra University, Kurukshetra.

Electrical & Electronics Engineering

1. Gupta, Rohit. **Development of hybrid ankle-foot prosthesis**. (Dr. Ravinder Agarwal), Department of Electrical and Instrumentation Engineering, Thapar Institute of Engineering and Technology, Patiala.

2. Rajni Bala. **Stable optimal planning of electric power distribution system using fuzzy logic**. (Dr. Smarajit Ghosh), Department of Electrical and Instrumentation Engineering, Thapar Institute of Engineering and Technology, Patiala.

3. Reeta Devi. **Study of heart rate variability signal and machine learning approach for early stage prediction of sudden cardiac death**. (Dr. Dinesh Kumar and Dr. Hitender Kumar Tyagi), Department of Electronic Science, Kurukshetra University, Kurukshetra.

Electronics & Communication Engineering

1. Kilaru, Aravind. **Model for link outage and rainfall vertical structure analysis for propagation studies at millimetre wave band**. (Dr. K Sarat Kumar), Department of Electronics & Communication Engineering, Koneru Lakshmaiah Education Foundation, Guntur.

2. Makwana, Balvant Jivabhai. **Investigation on efficient feeds for offsets parabolic reflector antenna with wide cross polar bandwidth**. (Dr. S B Sharma), Department of Electronics & Communication Engineering, Gujarat Technological University, Ahmedabad.

3. Patel, Nareshkumar Mohanlal. **Hyperspectral Unmixing**. (Dr. Himanshu Soni), Department of Electronics and Communication Engineering, Gujarat Technological University, Ahmedabad.

4. Putluri, Srinivasa Reddy. **Analysis of genomic sequences for exon prediction using adaptive signal processing algorithms**. (Dr. Md Z Rehman), Department of Electronics & Communication Engineering, Koneru Lakshmaiah Education Foundation, Guntur.

5. Saikia, Bhargabjyoti. **Analysis of impact of imperfect channel state information on the receiver performance over fading channels**. (Dr. Rupaban Subadar), Department of Electronics & Communication Engineering, North Eastern Hill University, Shillong.

6. Swarajya Lakshmi, M L S N. **Investigation on design of NOTCH band antennas with frequency and pattern reconfigurability for LTE, WIFI and WLAN applications**. (Dr. Habibulla Khan), Department of Electronics & Communication Engineering, Koneru Lakshmaiah Education Foundation, Guntur.

Instrumentation Engineering

1. Sunita, P. **Design of high transmission optical filter . using an efficient optimisation algorithm**. (Dr. Amit L Sharma), Faculty of Engineering Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

Mechanical Engineering

1. Jain, Akshay. **Ascertaining optimal process parameters for laser-cutting and drilling of basalt-glass hybrid composite**. (), Department of Mechanical Engineering, Jaypee University of Engineering and Technology, Guna.

2. Konada, Sirikondamallik. **An experimental investigation on nano coatings as bearing liners**. (Dr. K V

Ramana), Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Guntur.

3. Korade, Dileep Nanasaheb. **Experimental investigation of deep cryogenic treatment of H21 tool steel**. (Dr. K V Ramana and Dr. K R Jagtap), Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Guntur.

4. Sharma, Ankit. **Analysis of hole quality for pre-tempered float glass while using rotary ultrasonic machining**. (Dr. Vivek Jain and Dr. Dheeraj Gupta), Department of Mechanical Engineering, Thapar Institute of Engineering and Technology, Patiala.

5. Vijaya Kumar, T. **Experimental investigations on M0O$_3$ and its nanocomposites at elevated temperatures**. (Dr. K V Ramana), Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Guntur.

6. Walia, Arminder Singh. **Experimental investigations and analysis of electrical discharge machining of hardened EN31 steel using cermet tool tip**. (Dr. Vineet Srivastava and Dr. Vivek Jain), Department of Mechanical Engineering, Thapar Institute of Engineering and Technology, Patiala.

Nano technology

1. Singh, Mayank Kumar. **Development and evaluation of hybrid dendrimer-mediated multifunctional brain targeting nanodevice**. (Dr. S. Ramakrishna), Faculty of Engineering Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

MATHEMATICAL SCIENCES

Mathematics

1. Arshdeep Kaur. **Some methods for solving multi-attribute decision making problems under fuzzy environment and its extensions**. (Dr. Amit Kumar), School of Mathematics, Thapar Institute of Engineering and Technology, Patiala.

2. Bikramjeet Kaur. **Symmetry analysis and coservation laws for some systems of nonlinear partial differential equations**. (Dr. Rajesh Kumar Gupta), School of Mathematics, Thapar Institute of Engineering and Technology, Patiala.

3. Desai, Mansi Kishorbhai. **Mathematical approach in different phenomena arising in multiphase flow in porous media**. (Dr. Shailesh S. Patel), Department of Mathematics, Gujarat Technological University, Ahmedabad.

4. Patel, Hardik Pravinkumar. **Hydrodynamic bearing systems**. (Dr. Rakesh M Patel), Department of Mathematics, Gujarat Technological University, Ahmedabad.

MEDICAL SCIENCES

Biotechnology

1. Gurung, Arun Bahadur. **Development of a pharmacophore Developing of a pharmacophore model for screening of small molecules for their anti-inflammatory property in relation to cardiovascular diseases**. (Dr. Atanu Bhattacharjee), Department of Biotechnology, North Eastern Hill University, Shillong.

Pharmaceutical Science

1. Jain, Priyanka. **Development and characterization of engineered nanocarrier system for the treatment of glioma**. (Prof. Vandana Soni), Department of Pharmaceutical Sciences, Dr Harisingh Gour Vishwavidyalaya, Sagar.

2. Jaswandi, Udhavrao Girme. **A colloidal drug delivery system for anti-allergic drug**. (Dr. Naazneen Surti), Department of Pharmacy, Gujarat Technological University, Ahmedabad.

3. Mody, Nishi. **Development and characterization of tailored nanocarrier bearing antitumor bioactive for targeted solid tumor chemotheraphy**. (Prof.S P Vyas), Department of Pharmaceutical Sciences, Dr Harisingh Gour Vishwavidyalaya, Sagar.

4. Surati, Jasmina Shivlal. **Development and validation of stabililty indicating assay methods for estimation of anti diabetic drugs**. (Dr. Vandana B Patel), Department of Pharmacy, Gujarat Technological University, Ahmedabad.

5. Verma, Amit. **Development and characterization of antifungal drug delivery system for the effective treatment of fungal keratitis**. (Prof. Sanjay K Jain), Department of Pharmaceutical Sciences, Dr Harisingh Gour Vishwavidyalaya, Sagar.

PHYSICAL SCIENCES

Chemistry

1. Agarwal, Pinki Rani. **Development of resin based carbon foam for removal of As(V) from contaminated water**. (S.R. Dhakate), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

2. Das, Arindam Kumar. **Acid/base stable ion-exchange membranes for electrolysis and electrodialysis**. (Dr. Vinod K Shahi), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

3. Das, Satyajit. **Photochemically and thermally controlled physical properties of self assembled π−systems**. (Dr. A. Ajayaghosh), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

4. Duhan, Meenakshi. **Synthesis of some nitrogen and sulphur containing heterocyclic compounds as potential α-amylase inhibitors**. (Dr. Parvin Kumar), Department of Chemistry, Kurukshetra University, Kurukshetra.

5. Harshvardhan Singh. **Development of nanostructure metal oxides as efficient heterogeneous catalyst for C-H bond activation and functionalization**. (Dr.Subhash Chandra Ghosh), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

6. Krishnamurthy, M. **Click reaction on carbon nanomaterials and cellulose**. (Dr Debasis Samanta), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

7. Panicker, Jayanthy S. **Synthesis and study of thiophene based semiconducting small molecules for photovoltaic application**. (Dr. C. Vijayakumar), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

8. Parmar, Bhavesh Kumar. **Structural and functional studies on multidimensional coordination polymeric networks**. (Dr. E Suresh), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

9. Rajeswari, S. **Application of electrochemical treatment methods for tannery and plating industrial effluents**. (S. Maruthamuthu), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

10. Rakesh Kumar. **Synthesis and derivatization of N-heterocyclic compounds through C-H bond functionalization**. (Dr. Upendra Sharma), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

11. Ramesh, K. **Studies towards the synthesis of oxygen and nitrogen containing heterocycles**. (Dr. J.S. Yadav), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

12. Reddy, K Satheeshkumar. **Synthesis of macrolactone core of aspergillide D, diverse oxacyclic spiroox-indoles and imidazo heterocyclic cinnnolines**. (Dr B. V. Subba Reddy), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

13. Rohman, Mostofa Ataur. **Spectroscopic studies on some fluorescent organic molecules and their complexes with supramolecular hosts**. (Prof. Sivaprasad Mitra), Department of Chemistry, North Eastern Hill University, Shillong.

14. Swetha, S. **Investigations on ZnO based functional layers for enhanced photovoltaic performances in dye-sensitised solar cells**. (Dr. U S Hareesh), Faculty of Chemical Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

15. Vikram Kumar. **Wood composites: Thermal degradation and tensile properties**. (Dr. Sanjiv Arora), Department of Physical Chemistry, Kurukshetra University, Kurukshetra.

16. Warjri, Wandibahun. **Studies on the syntheses and efficiencies of semiconductor based photocatalysts**. (Dr. D P S Negi), Department of Chemistry, North Eastern Hill University, Shillong.

17. Yelampalli, Suresh Reddy. **Analytical method development and validation for the determination of impurities in various pharmaceutical drugs and finished dosage forms by using sophisticated analytical techniques**. (Dr. J V Shanmukh Kumar), Department of Chemistry, Koneru Lakshmaiah Education Foundation, Guntur.

Physics

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