

**INDIVIDUAL COURSE DETAILS****ITEC****Integrating Industry 4.0 (IR4.0) competency****and****21<sup>st</sup> century skills in Educational Institutions**

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| <b>A. Name of the Institute</b>  | <b>NATIONAL INSTITUTE OF TECHNICAL TEACHERS TRAINING AND RESEARCH<br/>TARAMANI, CHENNAI – 600 113.<br/>[Ministry of Education, Government of India]<br/>Taramani, Chennai – 600 113, INDIA.</b>  |
| <b>B. Title of the Course</b>  | <b>Integrating Industry 4.0 (IR4.0) competency and<br/>21<sup>st</sup> century skills in Educational Institutions</b>  |
| <b>C. Course Duration</b>  | Weeks : <b>Four weeks</b><br><br>Dates : 26 <sup>th</sup> July 2023 to 22 <sup>nd</sup> August 2023 (ITEC)   |
| <b>D. No. of days of Training</b>  | Days: 28 days  |
| <b>E. Eligibility Criteria for Participants</b><br><br>1. Educational Qualification<br><br>2. Work Experience<br><br>3. Age Limit<br><br>4. Target Group | Graduate Degree/ Diploma in Science / Education / Management / in Engineering / Technology/TVET and good proficiency in spoken, written and comprehension of English.<br><br>Working Experience related to Education / TVET / Technical Education / Vocational education / Industrial Education / Technical School / Polytechnic / University / Engineering College /Management Institute<br><br>less than 55 years<br><br>Government Policy Makers/ Administrators / Officials from the Ministry of Education / Higher Education / Technical Education / Vocational Education/ Human Resource Development / Labour Ministries / TVET related Ministries / Academic Leaders / Executives / Educational Administrators / Directors/ Heads / Senior Faculty of Institutions like TVET Institutes/ Vocational Colleges / Technical Schools / Polytechnics / Engineering Colleges / University Departments |
| <b>F. Aims &amp; Objectives of the Course</b>  | Upon completion of the course, the participants would be able to   |

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|  | <ul style="list-style-type: none"> <li>➤ understand the technologies under of Industrial Revolution (IR 4.0)</li> <li>➤ comprehend different drivers necessary for the transformation in IR4.0</li> <li>➤ list the 21<sup>st</sup> century skills</li> <li>➤ develop competency necessary in the Industry 4.0 era</li> <li>➤ gather competency necessary for the 21<sup>st</sup> century skills in education</li> <li>➤ Familiarise NHEQF, TVET System and NVEQF</li> <li>➤ comprehend with the pedagogy to deliver 21<sup>st</sup> century skills and IR 4.0</li> <li>➤ develop curriculum framework incorporating 21<sup>st</sup> century skills and IR 4.0</li> <li>➤ select suitable instructional methods and media</li> <li>➤ Appraise Industry-Institute partnership</li> <li>➤ use of ICT tools &amp; digital technology to integrate 21<sup>st</sup> century skills and IR 4.0 in Education</li> <li>➤ Assure Quality in Educational Institutions in the IR4.0 era</li> <li>➤ Prepare Action plan to integrate 21<sup>st</sup> Century skills and IR 4.0 in Educational Institutions</li> </ul> |
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| <p><b>G. Details of Content of the Course / Training Schedule</b> (<i>pl attach a simple thematic / day-wise schedule (topics covered)</i>).</p> | <p><b>Skill India Mission</b> is a government scheme launched in 2015. It is an umbrella scheme that has many skilling schemes and programmes under it. The chief objective is to empower the youth of the country with adequate skill sets that will enable their employment in relevant sectors and also improve productivity.</p> <p>Once the participants develop the skills related to IR 4.0 and 21<sup>st</sup> century skills, they will be able to integrate in their country.</p> <p><b>Topics to be covered:</b></p> <ol style="list-style-type: none"> <li>I. Industry 4.0 &amp; Industry 5.0 (Society 5.0) Technologies</li> <li>II. Different drivers necessary for the transformation in IR 4.0 era</li> <li>III. Ensuring 21<sup>st</sup> century skills and IR 4.0 for the Global Competitiveness and Innovation in the Educational Institutions</li> <li>IV. Educational Institutions to Address IR 4.0</li> <li>V. NHEQF, NSQF, TVET System and NVEQF</li> <li>VI. Effective pedagogy to deliver 21<sup>st</sup> century skills and IR 4.0</li> <li>VII. 21<sup>st</sup> century skills competency necessary for education</li> <li>VIII. Leadership and Collaboration</li> </ol> |
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|   | <p>IX. ICT &amp; Digital Technology to Integrate 21<sup>st</sup> century skills and IR 4.0</p> <p>X. Curriculum Design and Framework incorporating 21<sup>st</sup> century skills and IR 4.0 &amp; NCF</p> <p>XI. SWOT analysis on status of 21<sup>st</sup> Century skills and IR 4.0 in Educational Institutions</p> <p>XII. Industry-Institute partnership</p> <p>XIII. Pedagogy that enhances the session delivery of 21<sup>st</sup> Century skills and IR 4.0</p> <p>XIV. ICT tools and mobile apps to integrate 21<sup>st</sup> century skills and IR 4.0</p> <p>XV. Curriculum structure to integrate 21<sup>st</sup> Century skills and IR 4.0</p> <p>XVI. Instructional Methods and Media</p> <p>XVII. Research proposals and patents</p> <p>XVIII. OBE and Quality Assurance in Institutions</p> <p>XIX. Action plan to integrate 21<sup>st</sup> Century skills and IR 4.0 in Educational Institutions</p> <p>Seminar, Field Visits &amp; Cultural Visits</p>  |
| <p><b>H. Mode of Evaluation of Performance of the ITEC Participant</b></p>    | <p>Preparation of country specific assignments, development proposals and detailed project proposals to integrate the skills in their country; seminars based on the project works.</p>  |
| <p><b>I. Platform for delivery of online course (wherever applicable)</b></p> | <p>Four weeks - Contact mode</p>   |
| <p><b>J. Name of the Department</b></p>                                       | <p>Centre for International Affairs, NITTTR, Chennai</p>   |
| <p><b>K. Name of Coordinator</b></p>  | <p>Prof. Dr. G. Kulanthaivel</p> <p>Prof. Dr. G. Kulanthaivel, Professor of Electronics and Communication Engineering and Head, Centre for International Affairs, National Institute of Technical Teachers Training &amp; Research, Ministry of Education, Government of India, Chennai, India received his Ph.D. degree in Information and Communication Engineering from Anna University, Chennai. He completed his Master's degree in Microwave and Optical Engineering from Madurai Kamaraj University and Bachelor's Degree in Electronics and Communication Engineering from University of Madras. He has also obtained his Master's degree in Business Administration (M.B.A.) from TNOU, India. He is having experience of 28 years out of which more than 25 years in training of technical teachers in India and abroad. He has worked in Colombo Plan Staff College (CPSC), Manila, Philippines as Faculty Consultant &amp; Chairman of the Information and</p> |

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|                                   | <p>Communication Technology Division for nearly four years on Government of India deputation. He has also acted as Acting Director General of CPSC and Acting President of APACC for more than one year. He is an Accreditor for Asia-Pacific Accreditation and Certification Commission (APACC), Philippines from 2014.</p> <p>His area of interest includes Biomedical Engineering, Telemedicine, Computer Networking, Communication Engineering, IoT and Cyber Physical Systems, Virtual Instrumentation, ICT applications in Education and Training, TVET, Accreditation, Instructional Design and Delivery Systems. He has published/presented more than 100 papers in the National/International Journals/Conferences/Seminars. He has visited around 20 countries (Bangladesh, Bhutan, Brunei, China, Dubai, Fiji, Hong Kong, Indonesia, Laos PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Singapore, South Korea, Sri Lanka and Thailand) and conducted different Quality Improvement Programs. He has received many awards from different Organizations. He is member of many International/National Professional bodies including Institute of Electrical and Electronics Engineering {IEEE(USA)} and International Vocational Education and Training Association {IVETA – USA}. He is Fellow of the Institution of Electronics and Telecommunication Engineers - (FIETE), Fellow of the Institution of Engineers (India) - (FIE) and presently Chairman of IEEE Technology and Engineering Management Society (IEEE-TEMS Madras Chapter).</p> |
| <p><b>L. Resource persons</b></p> | <p>Faculty members of NITTTR<br/>Experts from Academic Institutes / Universities<br/>Industry experts</p>   |

## Integrating Industrial Revolution 4.0 (IR4.0) Competency and 21st Century Skills in Educational Institutions

### COURSE PROFILE

Industry 4.0 concerns the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing. Technologies such as Cyber Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics are considered to be the different drivers necessary for the transformation.

The concept of Industry 5.0 is a relatively new one. According to the European Union, Industry 5.0 “provides a vision of industry that aims beyond efficiency and productivity as the sole goals, and reinforces the role and the contribution of industry to society.” and “It places the wellbeing of the worker at the centre of the production process and uses new technologies to provide prosperity beyond jobs and growth while respecting the production limits of the planet.” It complements the Industry 4.0 approach by “specifically putting research and innovation at the service of the transition to a *sustainable, human-centric and resilient European industry*”.

21st century skills comprise skills, abilities, and learning dispositions that have been identified as being required for success in 21st century society and workplaces by educators, business leaders, academics, and governmental agencies. This is part of a growing international movement focusing on the skills required for students to master in preparation for success in a rapidly changing, digital society. Many of these skills are also associated with deeper learning, which is based on mastering skills such as analytic reasoning, complex problem solving, and teamwork. Its effects on the workplace, and thus on the demands on the educational system preparing students for the workforce, have been significant in several ways.

Fourth Industrial Revolution set a new momentum to training and development sector. The revolution brings new exciting opportunities and solutions to global challenges such as automation of industrialization. It will also produce new jobs that have yet to be invented. The critical challenge for skills development is serious skills mismatches despite growing investments in Technical Institutions especially in TVET. Thus governments, educators and policy maker alike must ask the questions about how they can prepare present and future Technical Institutions to thrive in this digital world. Technical and Vocational Education & Training in the Fourth Industrial Revolution (TVET 4.0) is a complex, dialectical and exciting opportunity which can potentially transform society for the better. The fourth industrial revolution is powered by artificial intelligence, Internet of Things (IoT) and it will transform the workplace from tasks based characteristics to the human centered characteristics. A cyber-physical system (CPS) or intelligent system is a computer system in which a mechanism is controlled or monitored by computer-based algorithms. Because of the convergence of man and machine, it will reduce the subject distance between humanities and social science as well as science and technology. This will necessarily require much more interdisciplinary teaching, research and innovation in Technical Institutions.

Therefore, Technical Institutions stakeholders have to set new initiatives and make efforts to integrate 21st century skills and to develop digital competencies in Technical Institutions to address IR 4.0 needs and produce globally competitive graduates and meet the needs of 21st century.

Technical and Vocational Education and Training (TVET) must properly prepare their students to live and work in the 21st Century. This preparation includes providing students with important skills needed in 21st Century and IR 4.0. In contrast to Industry 4.0, Society 5.0 shifts its focus on the impact of technology on the public and the aim and need to create a better society. However, a human-centered society will not happen without taking Sustainable Development Goals (SDG) into account, which the U.N. agreed to in 2015. Thus, this is very important to make the 21st century skills and components of IR 4.0 an integral part of Technical Institutions curricula. Technical Institutions especially TVET must put great efforts to improve the skills of the 21st century to produce graduates of quality Technical Institutions program aiming for high employability. Thus, NITTTTR, Chennai under ITEC of Ministry of External Affairs, Government of India is organizing this course to impart necessary concepts, integration processes, and guidelines to incorporate the very essential components - 21st century skills and components of IR 4.0 in the Technical Institutions system.