

**Government of Pakistan**

**National Vocational and Technical Training Commission**

**Prime Minister's Hunarmand Pakistan Program**

"Skill for All"



**Course Contents / Lesson Plan**

**Course Title:** Construction Materials Testing

**Duration:** 6 Months

## **Course Details / Description & Preliminaries**

<b>Course Title</b>	<b>Certificate in Construction Materials Testing</b>
<b>Objectives and Expectations</b>	<p><b>Employable skills and hands on practice for Construction Materials Testing.</b></p> <p>This is a special course designed to address unemployment in the youth. The course aims to achieve the above objective through hands on practical training delivery by a team of dedicated professionals having rich market/work experience. This course is therefore not just for developing a theoretical understanding/back ground of the trainees. Contrary to that it is primarily aimed at equipping the trainees to perform commercially in a market space in independent capacity or as a member of a team.</p> <p>The course therefore is designed to impart not only technical skills but also soft skills (i.e. interpersonal/communication skills; personal grooming of the trainees etc.) as well as entrepreneurial skills (i.e. marketing skills; free lancing etc.). The course also seeks to inculcate work ethics to foster better citizenship in general and improve the image of Pakistani work force in particular.</p> <p><b><u>Main Expectations:</u></b></p> <p>In short, the course under reference should be delivered by professional instructors in such a robust hand- on manner that the trainees are comfortably able to employ their skills for earning money (through wage/self-employment) at its conclusion.</p> <p>This course thus clearly goes beyond the domain of the traditional training practices in vogue and underscores an expectation that a market centric approach will be adopted as the main driving force while delivering it. The instructors should therefore be experienced enough to be able to identify the training needs for the possible market roles available out there. Moreover, they should also know the strengths and weaknesses of each individual</p>

trainee to prepare them for such market roles during/after the training.

- i. Specially designed practical tasks to be performed by the trainees have been included in the Annexure-I to this document. The record of all tasks performed individually or in groups must be preserved by the management of the training Institute clearly labeling name, trade, session etc so that these are ready to be physically inspected/verified through monitoring visits from time to time. The weekly distribution of tasks has also been indicated in the weekly lesson plan given in this document.
- ii. In order to materialize the main expectations, a special module on **Job Search & Entrepreneurial Skills** has been included in the later part of this course (5<sup>th</sup> & 6<sup>th</sup> month) through which, the trainees will be made aware of the Job search techniques in the local as well as international job markets (Gulf countries). Awareness around the visa process and immigration laws of the most favoured labour destination countries also forms a part of this module. Moreover, the trainees would also be encouraged to venture into self-employment and exposed to the main requirements in this regard. It is also expected that a sense of civic duties/roles and responsibilities will also be inculcated in the trainees to make them responsible citizens of the country.
- iii. A module on **Work Place Ethics** has also been included to highlight the importance of good and positive behavior at work place in the line with the best practices elsewhere in the world. An outline of such qualities has been given in the Appendix to this document. Its importance should be conveyed in a format that is attractive and interesting for the trainees such as through PPT slides +short video documentaries. Needless to say that if the training provider puts his heart and soul into these otherwise non-technical components, the image of Pakistani workforce would

undergo a positive transformation in the local as well as international job markets.

In order to maintain interest and motivation of the trainees throughout the course, modern techniques such as:

- Motivational Lectures
- Success Stories
- Case Studies

These techniques would be employed as an additional training tool wherever possible (these are explained in the subsequent section on Training Methodology).

Lastly, evaluation of the competencies acquired by the trainees will be done objectively at various stages of the training and proper record of the same will be maintained. Suffice to say that for such evaluations, practical tasks would be designed by the training providers to gauge the problem-solving abilities of the trainees.

#### **(i) Motivational Lectures**

The proposed methodology for the training under reference employs motivation as a tool. Hence besides the purely technical content, a trainer is required to include elements of motivation in his/her lecture. To inspire the trainees to utilize the training opportunity to the full and strive towards professional excellence. Motivational lectures may also include general topics such as the importance of moral values and civic role & responsibilities as a Pakistani. A motivational lecture should be delivered with enough zeal to produce a deep impact on the trainees. It may comprise of the following:

- Clear Purpose to convey message to trainees effectively.
- Personal Story to quote as an example to follow.
- Trainees Fit so that the situation is actionable by trainees and not represent a just idealism.
- Ending Points to persuade the trainees on changing themselves.

A good motivational lecture should help drive creativity, curiosity and spark the desire needed for trainees to want to learn more.

Impact of a successful motivational strategy is amongst others commonly visible in increased class participation ratios. It increases the trainees' willingness to be engaged on the practical tasks for longer time without boredom and loss of interest because they can clearly see in their mind's eye where their hard work would take them in short (1-3 years); medium (3 - 10 years) and long term (more than 10 years).

As this tool is expected that the training providers would make arrangements for regular well-planned motivational lectures as part of a coordinated strategy interspersed throughout the training period as suggested in the weekly lesson plans in this document.

## **(ii) Success Stories**

Another effective way of motivating the trainees is by means of Success Stories. Its inclusion in the weekly lesson plan at regular intervals has been recommended till the end of the training.

A success story may be disseminated orally, through a presentation or by means of a video/documentary of someone that has risen to fortune, acclaim, or brilliant achievement. A success story shows how a person achieved his goal through hard work, dedication and devotion. An inspiring success story contains compelling and significant facts articulated clearly and easily comprehensible words. Moreover, it is helpful if it is assumed that the reader/listener knows nothing of what is being revealed. Optimum impact is created when the story is revealed in the form of: -

- Directly in person (At least 2-3 cases must be arranged by the training institute)
- Through an audio/ videotaped message (2-3 high quality videos must be arranged by the training institute)

It is expected that the training provider would collect relevant high-quality success stories for inclusion in the training as suggested in the weekly

lesson plan given in this document.

Suggestive structure and sequence of a sample success story and its various shapes can be seen at annexure III.

### **(iii) Case Studies**

Where a situation allows, case studies can also be presented to the trainees to widen their understanding of the real-life specific problem/situation and to explore the solutions.

In simple terms, the case study method of teaching uses a real-life case example/a typical case to demonstrate a phenomenon in action and explain theoretical as well as practical aspects of the knowledge related to the same. It is an effective way to help the trainees comprehend in depth both the theoretical and practical aspects of the complex phenomenon in depth with ease. Case teaching can also stimulate the trainees to participate in discussions and thereby boost their confidence. It also makes class room atmosphere interesting thus maintaining the trainee interest in training till the end of the course.

Depending on suitability to the trade, the weekly lesson plan in this document may suggest case studies to be presented to the trainees. The trainer may adopt a power point presentation or video format for such case studies whichever is deemed suitable but it's important that only those cases are selected that are relevant and of a learning value.

The Trainees should be required and supervised to carefully analyze the cases.

For the purpose they must be encouraged to inquire and collect specific information / data, actively participate in the discussions and intended solutions of the problem / situation.

Case studies can be implemented in the following ways: -

- i. A good quality trade specific documentary (At least 2-3 documentaries must be arranged by the training institute)
- ii. Health & Safety case studies (2 cases regarding safety and industrial accidents must be arranged by the training institute)

	iii. Field visits (At least one visit to a trade specific major industry/ site must be arranged by the training institute)
<b>Entry level of trainees</b>	<p>Since intake level is Bachelor of Civil Engineering (BSCE)/D.A. E Civil Engineering so expectations from the trainees are:</p> <ul style="list-style-type: none"> <li>• To have concept of Construction of Civil Structures.</li> <li>• To have knowledge of Construction Materials.</li> </ul>
<b>Learning Outcome of the Course</b>	<p>By the end of this course, the trainees should gain the following competencies:</p> <ul style="list-style-type: none"> <li>• Sampling of Materials</li> <li>• Testing of Materials</li> <li>• Lab Management</li> <li>• Workshop Practices</li> <li>• Inspection Techniques</li> <li>• Safety Management</li> <li>• Basic Drawing</li> <li>• Digital Skills</li> <li>• AutoCAD</li> <li>• Soft Skills</li> <li>• Entrepreneurial Skills</li> </ul>
<b>Course Execution Plan</b>	Total Duration of Course: 6 Months (26 Weeks)
	Class Hours: 4 Hours per day (06 Days/Week)
	Theory: 20% Practical: 80%
	Weekly Hours: 24 Hours Per week
	Total Contact Hours: 600 Hours

<b>Companies Offering Jobs in the respective trade</b>	<ol style="list-style-type: none"> <li>1. Government Institutes</li> <li>2. All Private Institutes who are managing construction material testing</li> </ol>
<b>Job Opportunities</b>	<p>All over the world there is a high demand of material testing in construction industry. Material testing help u to understand and quantify whether o specific material or treatment is suitable for particular application. With the help of this course, we will be able to give technical trainings of Construction Material Testing to our youth. There are also opportunities for start-up/entrepreneurship due to the high market demand for the following designated jobs;</p> <ul style="list-style-type: none"> <li>• Testing Technician</li> <li>• Trainee Technician</li> <li>• Lab Technician</li> <li>• Material Inspector</li> <li>• Site Inspector</li> </ul>
<b>No of Students</b>	25
<b>Learning Place</b>	Classroom / Lab
<b>Instructional Resources</b>	<p>Learning Material:</p> <ul style="list-style-type: none"> <li>• <a href="https://www.astm.org/cms/drupal-7.51/newsroom/astm-standards-building-codes-available-dvd-and-online">https://www.astm.org/cms/drupal-7.51/newsroom/astm-standards-building-codes-available-dvd-and-online</a></li> <li>• <a href="https://www.transportation.org/">https://www.transportation.org/</a></li> </ul>



## WEEKLY SCHEDULE OF TRAINING

Scheduled Week	Module Title	Learning Units	Remarks
<b>Week 1</b>	Sampling of Materials	<ul style="list-style-type: none"> <li>• sampling and field-testing tools</li> <li>• sampling of construction materials.</li> <li>• sampling of construction process &amp; products</li> <li>• water sampling</li> <li>• Site Investigation Activities</li> <li>• Safety at Construction Site.</li> </ul>	<b>Task -1</b>
<b>Week 2</b>	Basic Drawing	<ul style="list-style-type: none"> <li>• Scales for Drawing</li> <li>• Geometrical Figures</li> <li>• Orthographic Projection</li> <li>• Dimensioning on Drawings</li> <li>• Symbol of Engineering Drawing</li> <li>• Construction Plan / Coordinates</li> </ul>	<b>Task -2</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 3</b>	Workshop Practices	<ul style="list-style-type: none"> <li>• wooden hand tools</li> <li>• wooden joinery work</li> <li>• wooden fastenings</li> <li>• cutting, threading &amp; reaming of pipes</li> <li>• pipes &amp; fittings</li> <li>• plumbing fixtures</li> <li>• Sewers</li> <li>• Basic Electric Installations</li> </ul>	<b>Task – 3</b>  <b>Task – 4</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 4</b>	Basic Lab Testing	<ul style="list-style-type: none"> <li>• Success story (For further detail please see Page No: 5 and Annexure-III at the end)</li> <li>• Testing tools &amp; equipment.</li> <li>• Operation and maintenance of the testing instrument &amp; equipment.</li> <li>• laboratory work for testing construction materials</li> <li>• Work in a Team Environment</li> <li>• Workplace ethics (See details at annexure II)</li> </ul>	<b>Task – 5</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 5</b>	Construction Practices-I	<ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 4)</li> <li>• Lay out Building plans</li> <li>• brick work</li> <li>• Construction of masonry steps and stairs</li> </ul>	<b>Monthly Test 1</b>

		<ul style="list-style-type: none"> <li>• Workplace ethics (See Workplace Ethics Guide at Appendix-B)</li> </ul>	
<b>Week 6</b>	Digital Skills	<ul style="list-style-type: none"> <li>• Success story (For further detail please see Page No: 5 and Annexure-III at the end)</li> <li>• computer operations</li> <li>• social media tools for collaboration and engagement</li> <li>• digital devices</li> <li>• MS Office</li> </ul>	<b>Task – 6</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 7</b>	AutoCAD	<ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 4)</li> <li>• Drafting Settings</li> <li>• 2D Drawings</li> <li>• 3D Drawings</li> <li>• Workplace ethics (See Workplace Ethics Guide at Appendix-B)</li> </ul>	<b>Task – 7</b>  <b>Task – 8</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 8</b>	Construction Practices - II	<ul style="list-style-type: none"> <li>• Success story (For further detail please see Page No: 5 and Annexure-III at the end)</li> <li>• subgrade, base, and bedding course for paving</li> <li>• Lay paving</li> <li>• Reinforced concrete work</li> <li>• sketches of bridges w.r.t. material of construction</li> <li>• sketches of permanent Way</li> <li>• sketches of station yards and signal</li> <li>• sketches of canals and head works</li> </ul>	<b>Task – 9</b>  <b>Task – 10</b>  <b>Task – 11</b>  <b>Task – 12</b>  <b>Task – 13</b>  <i>(Details may be seen at Annexure-I)</i>  <b>Monthly Test 2</b>
<b>Week 9</b>	Soil Testing	<ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 4)</li> <li>• Basic Properties of soil</li> <li>• Atterberg's Limits</li> <li>• Classify Soils</li> <li>• soil compaction tests in field</li> <li>• soil compaction tests in lab</li> <li>• permeability of soil</li> <li>• shear strength of soil</li> <li>• California Bearing Tests</li> <li>• bearing capacity of soil</li> </ul>	<b>Task – 14</b>  <b>Task – 15</b>  <b>Task – 16</b>  <b>Task – 17</b>  <b>Task – 18</b>  <b>Task – 19</b>

		<ul style="list-style-type: none"> <li>Workplace ethics (See details at annexure II)</li> </ul>	<i>(Details may be seen at Annexure-I)</i>
<b>Week 10</b>	Concrete Technology	<ul style="list-style-type: none"> <li>Properties of Fresh Concrete</li> <li>Quality Tests on Fine Aggregates for Concrete</li> <li>Quality tests on Coarse Aggregates for Concrete Mix Design</li> <li>Quality tests for Cement</li> <li>Destructive Tests on Hardened Concrete</li> <li>Concrete Mix Design</li> </ul>	<b>Task – 20</b> <b>Task – 21</b> <b>Task – 22</b> <b>Task – 23</b> <b>Task – 24</b> <b>Task – 25</b> <i>(Details may be seen at Annexure-I)</i>
<b>Week 11</b>	Water and Waste Water Testing	<ul style="list-style-type: none"> <li>Motivational Lecture (For further detail please see Page No: 4)</li> <li>Inorganic Matters in Water and Wastewater.</li> <li>Organic Matters in Water and Wastewater</li> <li>Physical Characteristics in water and wastewater.</li> <li>Hardness in Water and Wastewater</li> <li>Bacteriological Impurities in Water and Wastewater.</li> </ul>	<b>Task – 26</b> <b>Task – 27</b> <b>Task – 28</b> <b>Task – 29</b> <b>Task – 30</b> <i>(Details may be seen at Annexure-I)</i>
<b>Week 12</b>	Soft Skills	<ul style="list-style-type: none"> <li>Success story (For further detail please see Page No: 5 and Annexure-III at the end)</li> <li>Manage workforce planning</li> <li>Undertake project work</li> <li>Trends in career development</li> <li>Work safety in an office environment</li> <li>development of workplace documents</li> <li>Professionalism in the workplace</li> <li>schedules and meetings</li> </ul>	<b>Monthly Test 3</b>
<b>Week 13</b>	<b>• Mid Term Examination</b>		

<b>Week 14</b>	Highway Materials Testing	<ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 4)</li> <li>• Physical properties of the road metal</li> <li>• Strength Properties of road Metal</li> <li>• California bearing ratio of Road Base and Sub-Base</li> <li>• Basic properties of bitumen</li> <li>• Bituminous content in a pavement sample</li> <li>• Mix Design by Marshall Method</li> <li>• Workplace ethics (See details at annexure II)</li> </ul>	<b>Task – 31</b>  <b>Task – 32</b>  <b>Task – 33</b>  <b>Task – 34</b>  <b>Task – 35</b>  <b>Task – 35A</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 15</b>	Masonry Materials Testing	<ul style="list-style-type: none"> <li>• Physical Test for Brick &amp; Block</li> <li>• Chemical Test for Brick &amp; Block</li> <li>• Strength Test for Bricks &amp; Blocks</li> <li>• Physical Test for Lime</li> <li>• Chemical Test of lime</li> <li>• Strength Test for lime</li> <li>• Physical Test for Stones</li> <li>• Chemical Test of stones</li> <li>• Strength Test for stones</li> <li>• Success story (For further detail please see Page No: 5 and Annexure-III at the end)</li> </ul>	<b>Task – 36</b>  <b>Task – 37</b>  <b>Task – 38</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 16</b>	Testing Properties of Timber	<ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 4)</li> <li>• Strength Test on wood</li> <li>• Hardness and impact timber</li> <li>• Properties and types of locally manufactured timber</li> <li>• calculations of timber</li> <li>• Workplace ethics (See details at annexure II)</li> </ul>	<b>Task – 39</b>  <b>Task – 40</b>  <b>Task – 41</b>  <b>Task – 41A</b>  <i>(Details may be seen at Annexure-I)</i>  <b>Monthly Test 4</b>
<b>Week 17</b>	Calibration Techniques	<ul style="list-style-type: none"> <li>• Standard Calibration of pH</li> <li>• Standard Calibration of Weighing Balance</li> <li>• Standard Calibration of Pressure Gauge</li> </ul>	<b>Task – 42</b>  <b>Task – 43</b>

	Plant Supervision          Safety Management	<ul style="list-style-type: none"> <li>• Supervision of Operations of concrete Batching Plants</li> <li>• Supervision of Operations of Asphalt Concrete Plants</li> <li>• Supervision of Operations of Crushing Plants</li> <li>• Air Pollution</li> <li>• Noise Pollution</li> <li>• Safety at Construction Site.</li> <li>• Success story (For further detail please see Page No: 5 and Annexure-III at the end)</li> </ul>	<b>Task – 44</b>  <b>Task – 45</b>  <b>Task – 46</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 18</b>	Inspection Techniques          Job search	<ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 4)</li> <li>• Geotechnical Site Investigations</li> <li>• sampling, inspections and field testing at construction sites</li> <li>• inspection of construction materials, products &amp; processes.</li> <li>• construction faults in buildings</li> <li>• maintenance plan for roads</li> <li>• Job market&amp; job search</li> <li>• Job related skills.</li> <li>• Interpersonal skills</li> <li>• Communication skills</li> </ul>	<b>Task – 47</b>  <b>Task – 48</b>  <b>Task – 49</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 19</b>	Hydraulics Engineering	<ul style="list-style-type: none"> <li>• Hydrostatic pressure</li> <li>• Hydro kinematic Principles</li> <li>• Success story (For further detail please see Page No: 5 and Annexure-III at the end)</li> </ul>	<b>Task – 50</b>  <b>Task – 51</b>  <i>(Details may be seen at Annexure-I)</i>
<b>Week 20</b>	Lab Management	<ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 4)</li> <li>• laboratory work.</li> <li>• laboratory quality control procedures.</li> <li>• quality system and continuous improvement processes</li> </ul>	<b>Task – 52</b>  <b>Task – 53</b>  <i>(Details may be seen at Annexure-I)</i>

	Job search	<ul style="list-style-type: none"> <li>• Session on CV Building.</li> <li>• How to make notable CV.</li> <li>• Dos and Don'ts of CV making.</li> </ul>	<b>Monthly Test 5</b>
<b>Week 21</b>	Inspection and Testing of Concrete Structures-I	<ul style="list-style-type: none"> <li>• NDT by rebound hammer and Rebar Detector tests</li> <li>• Ultrasonic pulse velocity and Penetration Tests (Windsor Probe)</li> <li>• NDT Pull out Test and Profometer test</li> <li>• NDT by rebound hammer and Rebar Detector on RCC bridges</li> <li>• Ultrasonic pulse velocity and Penetration Tests (Windsor Probe) on concrete bridges</li> <li>• NDT Pull out Test and Profometer test on RCC bridges</li> </ul>	<b>Task – 54</b> <b>Task – 55</b> <b>Task – 56</b> <b>Task – 57</b> <b>Task – 58</b> <b>Task – 59</b> <b>Task – 59A</b> <i>(Details may be seen at Annexure-I)</i>
<b>Week 22</b>	Inspection and Testing of Concrete Structures-II	<ul style="list-style-type: none"> <li>• Flat Jack Test and Impulse Radar Test</li> <li>• Stress rupture Test and Creep Test on pipes</li> <li>• Full Notch Creep Test and Small-scale steady-state test</li> <li>• Tensile Test, Compression Test and Leakage Detection Test</li> <li>• hydraulic pressure test and 3 edge bearing test on RCC pipes</li> </ul>	<b>Task – 60</b> <b>Task – 61</b> <b>Task – 62</b> <i>(Details may be seen at Annexure-I)</i>
<b>Week 23</b>	Inspection and Testing of Steel Structures-I	<ul style="list-style-type: none"> <li>• Hardness Test on metals using Rockwell Method</li> <li>• Hardness Test on metals using Brinell Method</li> <li>• Impact test on metals</li> <li>• bending test on metals</li> <li>• Tensile Test on Metals Using Young's Modulus Apparatus</li> <li>• Tensile Test on Metals Using UTM</li> </ul>	<b>Task – 63</b> <b>Task – 64</b> <b>Task – 65</b> <b>Task – 66</b> <b>Task – 67</b> <b>Task – 68</b> <i>(Details may</i>

			<u>be seen at Annexure-I)</u>
<b>Week 24</b>	Inspection and Testing of Steel Structures-II	<ul style="list-style-type: none"> <li>• Torsion Tests on metals</li> <li>• Radiographic and Ultrasonic Testing on Steel Bridges</li> <li>• Dye Penetrant Inspection or Liquid Penetrant Inspection (LPI) on Steel Bridges</li> <li>• Magnetic Particle Inspection on Steel Bridges</li> <li>• Eddy Current Testing on Steel Bridges</li> <li>• Visual Inspection on Steel Bridges</li> </ul>	<b>Task – 69</b>  <b>Monthly Test 6</b>
<b>Week 25</b>	Entrepreneurial Skills	<ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 4)</li> <li>• Micro Business Opportunities</li> <li>• Micro Business Proposal</li> <li>• Business Plan.</li> <li>• Finances for The Micro Business</li> <li>• Human Resources</li> <li>• Products and Services.</li> <li>• Business Performance</li> <li>• Resolving Business Issues</li> <li>• Success story (For further detail please see Page No: 5 and Annexure-III at the end)</li> </ul>	
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<b>Week 26</b>	<b>FINAL PROJECT</b>	• <b>Final Project Demonstration/Examination</b>	
	Motivational Lectures, Success Stories and Final Assessment in project	<ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 4)</li> <li>• Success story (For further detail please see Page No: 5 and Annexure-III at the end)</li> </ul>	<b>Final Assessment</b>

## Annexure-I:

### Tasks For Certificate in Construction Material Testing

Task No.	Task	Description	Week
1	Sampling of Materials	Perform sampling of construction materials.	Week-1
2	Basic Drawing	Perform Dimensioning on Drawings and developing symbol of engineering drawing.	Week-2
3	Plumbing	Perform cutting, threading & reaming of pipes and Install plumbing fixtures.	Week-3
4	Electric Installations	Perform Basic Electric Installations	
5	Basic Lab Testing	Conduct laboratory work for testing construction materials	Week-4
6	Digital Skills	Perform computer operations and Operate MS Word applications	Week-6
7	2D Engineering Drawings.	Develop 2D Drawings.	Week-7
8	3D Engineering Drawings.	Develop 3D Drawings.	
9	subgrade, base, and bedding course	Prepare subgrade, base, and bedding course for paving.	Week-8
10	bridges w.r.t. material of construction	Produce sketches of bridges w.r.t. material of construction	
11	permanent Way	Produce sketches of permanent Way	
12	station yards and signal	Produce sketches of station yards and signal	
13	canals and head works	Produce sketches of canals and head works	
14	Properties of soil	Determine Basic Properties of soil	Week-9
15	Atterberg's Limits	Determine Atterberg's Limits	
16	soil compaction tests	Conduct soil compaction tests in field and lab.	
17	California Bearing Tests	Conduct California Bearing Tests	
18	permeability of soil	Determine permeability of soil	
19	shear strength of soil	Determine the shear strength of soil	Week-10
20	Properties of Fresh Concrete	Test the Properties of Fresh Concrete	
21	Quality Tests on Fine Aggregates for Concrete.	Perform the Quality Tests on Fine Aggregates for Concrete.	



<b>Task No.</b>	<b>Task</b>	<b>Description</b>	<b>Week</b>
<b>22</b>	Quality tests on Coarse Aggregates for Concrete Mix Design.	Perform Quality tests on Coarse Aggregates for Concrete Mix Design	
<b>23</b>	quality tests for Cement	Perform quality tests for Cement	
<b>24</b>	Destructive Tests on Hardened Concrete	Perform Destructive Tests on Hardened Concrete	
<b>25</b>	Concrete Mix Design	Perform Evaluate Concrete Mix Design	
<b>26</b>	inorganic matters in water and wastewater.	Determine the inorganic matters in water and wastewater.	<b>Week-11</b>
<b>27</b>	organic matters in water and wastewater	Determine organic matters in water and wastewater	
<b>28</b>	Physical Characteristics in water and wastewater.	Determine the Physical Characteristics in water and wastewater.	
<b>29</b>	Hardness in Water and Wastewater	Determine the Hardness in Water and Wastewater	
<b>30</b>	bacteriological impurities in Water and Wastewater.	Determine the bacteriological impurities in Water and Wastewater.	
<b>31</b>	physical properties of the road metal	Determine the physical properties of the road metal	<b>Week-14</b>
<b>32</b>	Strength Properties of road Metal	Determine Strength Properties of road Metal	
<b>33</b>	California bearing ratio of Road Base and Sub-Base	Determine California bearing ratio of Road Base and Sub-Base.	
<b>34</b>	Bituminous content in a pavement sample	Determine the bituminous content in a pavement sample	

Task No.	Task	Description	Week
35	Mix Design by Marshall Method.	Determine the Mix Design by Marshall Method.	
35A	Build your CV	Download professional CV template from any good site ( <a href="https://www.coolfreecv.com">https://www.coolfreecv.com</a> or relevant) <ul style="list-style-type: none"> <li>• Add Personal Information</li> <li>• Add Educational details</li> <li>• Add Experience/Portfolio</li> </ul> Add contact details/profile links	
36	Physical, Chemical and Strength for Brick & Block	Perform Physical, Chemical and Strength for Brick & Block	Week-15
37	Physical, Chemical and Strength for Lime	Perform Physical, Chemical and Strength for Lime	
38	Physical, Chemical and Strength Test for Stones	Perform Physical, Chemical and Strength Test for Stones	
39	Physical, Chemical and Strength on wood	Perform Physical, Chemical and Strength on wood	Week-16
40	hardness and impact timber	Determine hardness and impact timber	
41	properties and types of locally manufactured timber	Determine properties and types of locally manufactured timber	
41A	Create an account profile on Fiverr (at least two gigs) and Upwork	Create an account by following these steps: Step 1: Personal Info Step 2: Professional Info Step 3: Linked Accounts Step 4: Account Security	
42	Standard Calibration of pH	Perform Standard Calibration of pH	Week-17
43	Standard Calibration	Perform Standard Calibration of Weighing	

<b>Task No.</b>	<b>Task</b>	<b>Description</b>	<b>Week</b>
	of Weighing Balance	Balance	
<b>44</b>	Standard Calibration of Pressure Gauge	Perform Standard Calibration of Pressure Gauge	
<b>45</b>	Noise Pollution	Determine Noise Pollution	
<b>46</b>	Safety at Construction Site.	Manage Safety at Construction Site.	
<b>47</b>	Geotechnical Site Investigation	Conduct Geotechnical Site Investigation	<b>Week-18</b>
<b>48</b>	sampling, inspections and field testing at construction sites	Supervise sampling, inspections and field testing at construction sites	
<b>49</b>	inspection of construction materials, products & processes.	Plan & conduct the inspection of construction materials, products & processes.	
<b>50</b>	Hydrostatic pressure	Determine Hydrostatic pressure	
<b>51</b>	Hydro kinematic Principles	Apply Hydro kinematic Principles	<b>Week-19</b>
<b>52</b>	laboratory work.	Plan and organize the laboratory work.	
<b>53</b>	quality control procedures.	Implement laboratory quality control procedures.	<b>Week-20</b>
<b>54</b>	NDT by rebound hammer and Rebar Detector tests	Perform NDT by rebound hammer and Rebar Detector tests	
<b>55</b>	Ultrasonic pulse velocity and Penetration Tests (Windsor Probe)	Perform Ultrasonic pulse velocity and Penetration Tests (Windsor Probe)	<b>Week-21</b>
<b>56</b>	NDT Pull out Test and Profometer test	Perform NDT Pull out Test and Profometer test	
<b>57</b>	NDT by rebound	Perform NDT by rebound hammer and Rebar	

Task No.	Task	Description	Week
	hammer and Rebar Detector on RCC bridges	Detector on RCC bridges	
58	Ultrasonic pulse velocity and Penetration Tests (Windsor Probe) on concrete bridges	Perform Ultrasonic pulse velocity and Penetration Tests (Windsor Probe) on concrete bridges	
59	NDT Pull out Test and Profometer test on RCC bridges	Perform NDT Pull out Test and Profometer test on RCC bridges	
59A	How to search and apply for jobs in at least two labor marketplace countries (KSA, UAE, etc.)	<ul style="list-style-type: none"> <li>• Browse the following website and create an account on each website <ul style="list-style-type: none"> <li>▪ Bayt.com – The Middle East Leading Job Site</li> <li>▪ Monster Gulf – The International Job Portal</li> <li>▪ Gulf Talent – Jobs in Dubai and the Middle East</li> </ul> </li> <li>• Find the handy 'search' option at the top of your homepage to search for the jobs that best suit your skills.</li> <li>• Select the job type from the first 'Job Type' drop-down menu, next, select the location from the second drop- down menu.</li> <li>• Enter any keywords you want to use to find suitable job vacancies.</li> <li>• On the results page you can search for part-time jobs only, full-time jobs only, employers only, or agencies only. Tick the boxes as appropriate to your search.</li> <li>• Search for jobs by: <ul style="list-style-type: none"> <li>▪ Company</li> <li>▪ Category</li> <li>▪ Location</li> <li>▪ All jobs</li> <li>▪ Agency</li> </ul> </li> </ul>	

Task No.	Task	Description	Week
		<ul style="list-style-type: none"> <li>Industry</li> </ul>	
60	Flat Jack Test and Impulse Radar Test	Perform Flat Jack Test and Impulse Radar Test	Week-22
61	Stress rupture Test and Creep Test on pipes	Perform Stress rupture Test and Creep Test on pipes	
62	Full Notch Creep Test and Small-scale steady-state test	Perform Full Notch Creep Test and Small-scale steady-state test	
63	Hardness Test on metals using Rockwell Method	Perform Hardness Test on metals using Rockwell Method	Week-23
64	Hardness Test on metals using Brinell Method	Perform Hardness Test on metals using Brinell Method	
65	Impact test on metals	Conduct Impact test on metals	
66	bending test on metals	Conduct bending test on metals	
67	Tensile Test on Metals Using Young's Modulus Apparatus	Conduct Tensile Test on Metals Using Young's Modulus Apparatus	
68	Tensile Test on Metals Using UTM	Conduct Tensile Test on Metals Using UTM	

## Annexure-II

### **SUGGESTIVE FORMAT AND SEQUENCE ORDER OF MOTIVATIONAL LECTURE.**

#### **Mentor**

Mentors are provided an observation checklist form to evaluate and share their observational feedback on how students within each team engage and collaborate in a learning environment. The checklist is provided at two different points: Once towards the end of the course. The checklists are an opportunity for mentors to share their unique perspective on group dynamics based on various team activities, gameplay sessions, pitch preparation, and other sessions, giving insights on the nature of communication and teamwork taking place and how both learning outcomes and the student experience can be improved in the future.

#### **Session- 1 (Communication):**

Please find below an overview of the activities taking place Session plan that will support your delivery and an overview of this session's activity.

Session- 1 OVERVIEW
Aims and Objectives:
<ul style="list-style-type: none"><li>• To introduce the communication skills and how it will work</li><li>• Get to know mentor and team - build rapport and develop a strong sense of a team</li><li>• Provide an introduction to communication skills</li><li>• Team to collaborate on an activity sheet developing their communication, teamwork, and problem-solving</li><li>• Gain an understanding of participants' own communication skills rating at the start of the program</li></ul>

Activity:	Participant Time	Teacher Time	Mentor Time
Intro Attend and contribute to the scheduled.			
Understand good communication skills and how it works.			
Understand what good communication skills mean			
Understand what skills are important for good communication skills			

<b>Key learning outcomes:</b>	<b>Resources:</b>	<b>Enterprise skills developed:</b>
<ul style="list-style-type: none"> <li>• Understand the communication skills and how it works.</li> <li>• Understand what communication skills mean</li> <li>• Understand what skills are important for communication skills</li> </ul>	<ul style="list-style-type: none"> <li>• Podium</li> <li>• Projector</li> <li>• Computer</li> <li>• Flip Chart</li> <li>• Marker</li> </ul>	<ul style="list-style-type: none"> <li>• Communication</li> <li>• Self Confidence</li> <li>• Teamwork</li> </ul>

<b>Schedule</b>	<b>Mentor Should do</b>
<b>Welcome: 5 min</b>	<p>Short welcome and ask the <b>Mentor</b> to introduce him/herself.</p> <p>Provide a brief welcome to the qualification for the class.</p> <p>Note for Instructor: Throughout this session, please monitor the session to ensure nothing inappropriate is being happened.</p>
<b>Icebreaker: 10 min</b>	<p>Start your session by delivering an icebreaker, this will enable you and your team to start to build rapport and create a team presentation for the tasks ahead.</p> <p>The icebreaker below should work well at introductions and encouraging communication, but feel free to use others if you think they are more appropriate. It is important to encourage young people to get to know each other and build strong team links during the first hour; this will help to increase their motivation and communication throughout the sessions.</p>
<b>Introduction &amp; Onboarding: 20mins</b>	<p>Provide a brief introduction of the qualification to the class and play the “Onboarding Video or Presentation”.</p> <p>In your introduction cover the following:</p> <ol style="list-style-type: none"> <li>1. Explanation of the program and structure. (Kamyab jawan Program)</li> <li>2. How you will use your communication skills in your professional life.</li> <li>3. Key contacts and key information – e.g. role of teacher, mentor, and SEED. Policies and procedures (user agreements and “contact us” section). Everyone to go to the Group Rules tab at the top of their screen, read out the rules, and ask everyone to verbally agree. Ensure that the consequences are clear for using the platform outside of hours. (9am-8pm)</li> </ol>

	<p>4. What is up next for the next 2 weeks ahead so young people know what to expect (see pages 5-7 for an overview of the challenge). Allow young people to ask any questions about the session topic.</p>
<p><b>Team Activity Planning:</b> <b>30 minutes</b></p>	<p><b>MENTOR:</b> Explain to the whole team that you will now be planning how to collaborate for the first and second collaborative Team Activities that will take place outside of the session. There will not be another session until the next session so this step is required because communicating and making decisions outside of a session requires a different strategy that must be agreed upon so that everyone knows what they are doing for this activity and how.</p> <ul style="list-style-type: none"> <li>• “IDENTIFY ENTREPRENEURS” TEAM ACTIVITY</li> <li>• “BRAINSTORMING SOCIAL PROBLEMS” TEAM ACTIVITY</li> </ul> <p><i>As a team, collaborate on a creative brainstorm on social problems in your community. Vote on the areas you feel most passionate about as a team, then write down what change you would like to see happen.</i></p> <p>Make sure the teams have the opportunity to talk about how they want to work as a team through the activities e.g. when they want to complete the activities, how to communicate, the role of the project manager, etc.</p> <p>Make sure you allocate each young person a specific week that they are the project manager for the weekly activities and make a note of this.</p> <p>Type up notes for their strategy if this is helpful - it can be included underneath the Team Contract.</p>
<p><b>Session Close:</b> <b>5 minutes</b></p>	<p><b>MENTOR:</b> Close the session with the opportunity for anyone to ask any remaining questions.</p> <p><b>Instructor:</b></p> <p>Facilitate the wrap-up of the session. A quick reminder of what is coming up next and when the next session will be.</p>



## **MOTIVATIONAL LECTURES LINKS.**

<b><u>TOPIC</u></b>	<b><u>SPEAKER</u></b>	<b><u>LINK</u></b>
How to Face Problems In Life	Qasim Ali Shah	<a href="https://www.youtube.com/watch?v=OrQte08MI90">https://www.youtube.com/watch?v=OrQte08MI90</a>
Just Control Your Emotions	Qasim Ali Shah	<a href="https://www.youtube.com/watch?v=JzFs_yJt-w">https://www.youtube.com/watch?v=JzFs_yJt-w</a>
How to Communicate Effectively	Qasim Ali Shah	<a href="https://www.youtube.com/watch?v=PhHAQEGehKc">https://www.youtube.com/watch?v=PhHAQEGehKc</a>
Your ATTITUDE is Everything	Tony Robbins Les Brown David Goggins Jocko Willink Wayne Dyer Eckart Tolle	<a href="https://www.youtube.com/watch?v=5fS3rj6elFg">https://www.youtube.com/watch?v=5fS3rj6elFg</a>
Control Your EMOTIONS	Jim Rohn Les Brown TD Jakes Tony Robbins	<a href="https://www.youtube.com/watch?v=chn86sH0O5U">https://www.youtube.com/watch?v=chn86sH0O5U</a>
Defeat Fear, Build Confidence	Shaykh Atif Ahmed	<a href="https://www.youtube.com/watch?v=s10dzfbozd4">https://www.youtube.com/watch?v=s10dzfbozd4</a>
Wisdom of the Eagle	Learn Kurooji	<a href="https://www.youtube.com/watch?v=bEU7V5rJTtw">https://www.youtube.com/watch?v=bEU7V5rJTtw</a>
The Power of ATTITUDE	Titan Man	<a href="https://www.youtube.com/watch?v=r8LJ5X2ejqU">https://www.youtube.com/watch?v=r8LJ5X2ejqU</a>
STOP WASTING TIME	Arnold Schwarzenegger	<a href="https://www.youtube.com/watch?v=kzSBrJmXqdg">https://www.youtube.com/watch?v=kzSBrJmXqdg</a>
Risk of Success	Denzel Washington	<a href="https://www.youtube.com/watch?v=tbnzAVRZ9Xc">https://www.youtube.com/watch?v=tbnzAVRZ9Xc</a>

## **Workplace/Institute Ethics Guide**

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Work ethic is a standard of conduct and values for job performance. The modern definition of what constitutes good work ethics often varies. Different businesses have different expectations. Work ethic is a belief that hard work and diligence have a moral benefit and an inherent ability, virtue or value to strengthen character and individual abilities. It is a set of values centered on importance of work and manifested by determination or desire to work hard.

The following ten work ethics are defined as essential for student success:

**1. Attendance:**

Be at work every day possible, plan your absences don't abuse leave time. Be punctual every day.

**2. Character:**

Honesty is the single most important factor having a direct bearing on the final success of an individual, corporation, or product. Complete assigned tasks correctly and promptly. Look to improve your skills.

**3. Team Work:**

The ability to get along with others including those you don't necessarily like. The ability to carry your own weight and help others who are struggling. Recognize when to speak up with an ideas and when to compromise by blend ideas together.

**4. Appearance:**

Dress for success, set your best foot forward, personal hygiene, good manner, remember that the first impression of who you are can last a life time

**5. Attitude:**

Listen to suggestions and be positive, accept responsibility. If you make a mistake, admit it. Values workplace safety rules and precautions for personal and co-worker safety. Avoids unnecessary risks. Willing to learn new processes, systems and procedures in light of changing responsibilities.

**6. Productivity:**

Do the work correctly, quality and timelines are prized. Get along with fellows, cooperation

is the key to productivity. Help out whenever asked, do extra without being asked. Take pride in your work, do things the best you know how. Eagerly focuses energy on accomplishing tasks, also referred to as demonstrating ownership. Takes pride in work.

**7. Organizational Skills:**

Make an effort to improve, learn ways to better yourself. Time management; utilize time and resources to get the most out of both. Takes an appropriate approach to social interactions at work. Maintains focus on work responsibilities.

**8. Communication:**

**Written communication**, being able to correctly write reports and memos.

**Verbal communications**, being able to communicate one on one or to a group.

**9. Cooperation:**

Follow institute rules and regulations, learn and follow expectations. Get along with fellows, cooperation is the key to productivity. Able to welcome and adapt to changing workplace situations and the application of new or different skills.

**10. Respect:**

Work hard, work to best of your ability. Carry out orders, do what's asked the first time. Show respect, accept and acknowledge an individual's talents and knowledge. Respects diversity in the workplace, including showing due respect for different perspectives, opinions and suggestions.

## **SUGGESTIVE FORMAT AND SEQUENCE ORDER OF SUCCESS STORY**

<b>S. No</b>	<b>Key Information</b>	<b>Detail/Description</b>
1.	<b>Self &amp; Family background</b>	<ul style="list-style-type: none"> <li>• Self-introduction</li> <li>• Family background and socio economic status,</li> <li>• Education level and activities involved in</li> <li>• Financial hardships etc</li> </ul>
2.	<b>How he came on board NAVTTC Training/ or got trained through any other source</b>	<ul style="list-style-type: none"> <li>• Information about course, apply and selection</li> <li>• Course duration, trade selection</li> <li>• Attendance, active participation, monthly tests, interest in lab work</li> </ul>
3.	<b>Post training activities</b>	<ul style="list-style-type: none"> <li>• How job / business (self-employment) was set up</li> <li>• How capital was managed (loan (if any) etc).</li> <li>• Detail of work to share i.e. where is job or business being done; how many people employed ( in case of self-employment/ business )</li> <li>• Monthly income or earnings and support to family</li> <li>• Earning a happy life than before</li> </ul>
4.	<b>Message to others (under training)</b>	<ul style="list-style-type: none"> <li>• Take the training opportunity seriously</li> <li>• Impose self-discipline and ensure regularity</li> <li>• Make Hard work pays in the end so be always ready for the same.</li> </ul>

**Note: Success story is a source of motivation for the trainees and can be presented in a number of ways/forms in a NAVTTC skill development course as under: -**

1. To call a passed out successful trainee of institute. He will narrate his success story to the trainees in his own words and meet trainees as well.
2. To see and listen to a recorded video/clip (5 to 7 minutes) showing a successful trainee Audio video recording that has to cover the above mentioned points.
3. The teacher displays the picture of a successful trainee (name, trade, institute, organization, job, earning etc) and narrates his/her story in teacher's own motivational words.