

Government of Pakistan

**National Vocational and Technical Training Commission**

**Prime Minister's Hunarmand Pakistan Program**

"Skills for All"



**Course Contents / Lesson Plan**

**Course Title:** System Administration and Infrastructure Service

**Duration:** 6 Months

**Revised Edition**

<b>Trainer Name</b>	
<b>Course Title</b>	<b>System Administration and Infrastructure Service</b>
<b>Objectives and Expectations</b>	<p><b>Employable skills and hands on practice for Graphic Designing and video editing</b></p> <p>This six months' program you equip with Linux/Windows administration "survival skills" by focusing on foundational Linux/Windows concepts and core tasks. You will learn how to apply command-line concepts and enterprise-level tools, starting you on your journey toward becoming a full-time System Administrator</p> <p>Students in this six months program have the opportunity to learn the technical</p> <ul style="list-style-type: none"> <li>• Use administrative techniques and tools in Windows Server 2019.</li> <li>• Implement identity Services.</li> <li>• Manage network infrastructure services.</li> <li>• Configure file servers and storage.</li> <li>• Manage virtual machines using Hyper-V virtualization and containers</li> <li>• Implement high availability and disaster recovery solutions.</li> <li>• Apply security features to protect critical resources.</li> <li>• Configure Remote Desktop Services.</li> <li>• Configure a virtual machine-based desktop infrastructure deployment.</li> <li>• Implement remote access and web services.</li> <li>• Implement service monitoring and performance monitoring, and apply troubleshooting.</li> <li>• Perform upgrades and migration related to AD DS, and storage.</li> </ul> <p><b>LINUX</b></p> <ul style="list-style-type: none"> <li>• Understand and use essential tools for handling files, directories, command-line environments, and documentation</li> <li>• Create simple shell scripts</li> <li>• Operate running systems, including booting into different run levels, identifying processes, starting and stopping virtual machines, and controlling services</li> <li>• Configure local storage using partitions and logical volumes</li> <li>• Create and configure file systems and file system attributes, such as permissions, encryption, access control lists, and network file systems</li> <li>• Deploy, configure, and maintain systems, including software installation, update, and core services</li> <li>• Manage users and groups</li> <li>• Manage security, including basic firewall and SELinux configuration</li> <li>• Perform basic container management</li> </ul>

### **Main Expectations:**

In short, the course under reference should be delivered by professional instructors in such robust hands- on manner that the trainees are comfortably able to employ their skills for earning money (through wage/self-employment) at its conclusion.

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

- 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.
- 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.
- 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.

- **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.

Course related motivational lecture online link is available in **annexure 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)

	<ul style="list-style-type: none"> <li>Through an audio/ videotaped message (2-3 high quality videos must be arranged by the training institute)</li> </ul> <p>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.</p> <p>Suggestive structure and sequence of a sample success story and its various shapes can be seen at <b>annexure III</b>.</p> <p><b>• Case Studies</b></p> <p>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.</p> <p>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.</p> <p>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.</p> <p>The Trainees should be required and supervised to carefully analyze the cases.</p> <p>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.</p> <p>Case studies can be implemented in the following ways: -</p> <ul style="list-style-type: none"> <li>A good quality trade specific documentary ( At least 2-3 documentaries must be arranged by the training institute)</li> <li>Health &amp; Safety case studies (2 cases regarding safety and industrial accidents must be arranged by the training institute)</li> <li>Field visits( At least one visit to a trade specific major industry/ site must be arranged by the training institute)</li> </ul>
<b>Entry level of trainees</b>	Intermediate
<b>Learning Outcomes of the course</b>	<p>By the end of this course, students will be able to:</p> <ul style="list-style-type: none"> <li>To learn how to install and configure a Server based operating system</li> <li>To learn how to manage users and groups, as well as best practices for supporting the users (customers) of an organization's computing infrastructure</li> <li>To understand how to create and use Unix/Windows file systems</li> <li>To appreciate the importance of ethics in system administration, and to</li> </ul>

	<p>understand and apply a set of ethical</p> <ul style="list-style-type: none"> <li>• rules in management of a computer system</li> <li>• To become familiar with a basic set of Unix/Windows operating commands and utilities</li> <li>• To understand the importance of communication and documentation, and use software tools to keep active</li> <li>• documentation of system changes and to track and manage customer requests</li> <li>• To understand the importance of automation, and be able to create scripts and use other tools to automate system management procedures</li> <li>• To know some basic security measures to take in system administration</li> <li>• To prepare for possible disasters, including an understanding of backup and restoration of file systems</li> <li>• To know how to manage system resources, including methods for tracking system metrics</li> <li>• To apply these skills in the administration of an actual computer system with actual users (customers)</li> </ul>
<b>Course Execution Plan</b>	<p>Total duration of course: <b>6 months (26 Weeks)</b></p> <p>Class hours: <b>4 hours per day</b></p> <p>Theory: <b>20%</b></p> <p>Practical: <b>80%</b></p> <p>Weekly hours: <b>20 hours per week</b></p> <p>Total contact hours: <b>520hours</b></p>
<b>Companies offering jobs in the respective trade</b>	<ol style="list-style-type: none"> <li>1. Software Houses</li> <li>2. IT Universities</li> <li>3. News Offices</li> <li>4. Telecom Companies</li> <li>5. Banking Companies</li> <li>6. Game Design Studios</li> <li>7. Freelancing Websites</li> <li>8. Book/magazine publishers</li> <li>9. Interior/furniture design houses</li> <li>10. Textile Companies</li> </ol>
<b>Job Opportunities</b>	<p>3D Animation, VR &amp; SIMULATION, also known as Communication and Visual design is recognized across the world as the leader in visual content design. Graphic designers thus hold a high rate of employability in various capacities across various industries. As long as social media, visual and communication space, digital design and interaction landscape is alive and functioning, Graphic Designers will always have a pivotal role in how the digital and communication world appears to everyone. Following are some of the roles that are present and or may become available as trends shift and morph to the Graphic Designer:</p> <p>Animator Web designer Mobile app designer Video editor</p>

	Illustrator Graphic Designer Game asset creator Logo creator Social media and marketing specialist
<b>No of Students</b>	25
<b>Learning Place</b>	Classroom / Lab
<b>Instructional Resources</b>	<p><a href="https://freecomputerbooks.com/unixSystemAdministrationBooks.html">https://freecomputerbooks.com/unixSystemAdministrationBooks.html</a></p> <p>Books for System Administration</p> <p><a href="https://www.eduonix.com/courses/system-programming/fundamentals-of-unix-and-linux-system-administration">https://www.eduonix.com/courses/system-programming/fundamentals-of-unix-and-linux-system-administration</a></p> <p>Fundamentals of Unix and Linux System Administration</p> <p><a href="https://www.linuxtoday.com/blog/">https://www.linuxtoday.com/blog/</a></p> <p>Linux Blog</p> <p><a href="https://www.coursera.org/learn/system-administration-it-infrastructure-services">https://www.coursera.org/learn/system-administration-it-infrastructure-services</a></p> <p>System Administration on Coursera</p> <p><a href="https://opensource.com/education/15/9/system-administration-homework">https://opensource.com/education/15/9/system-administration-homework</a></p> <p>System Administration</p> <p><a href="https://www.classcentral.com/course/system-administration-it-infrastructure--10219">https://www.classcentral.com/course/system-administration-it-infrastructure--10219</a></p> <p>Free System Administration Course</p>

## MODULES

Scheduled Weeks	Module Title	Learning Units	Remarks
Week 1	Introduction to Windows Server Administration Overview	<ul style="list-style-type: none"> <li>• <b>Motivational Lecture</b>( <i>For further detail please see Page No: 3&amp; 4</i>)</li> <li>• <b>Course Introduction</b></li> <li>• <b>Job market</b></li> <li>• <b>Course Applications</b></li> <li>• <b>Institute/work ethics</b></li> </ul> <p>describes how to distinguish different Windows Server 2019 editions and techniques for deployment, servicing and activation. The module also introduces Windows Server Core and compares it with the Desktop Experience version. The module describes tools and concepts for administering Windows Server, such as Windows Admin Center, PowerShell, and delegation of privileges. Explore great works of past and present iconic graphic designers</p> <ul style="list-style-type: none"> <li>• Overview of Windows Server administration principles and tools</li> <li>• Introducing Windows Server 2019</li> <li>• Windows Server Core Overview</li> <li>•</li> </ul>	<p><b>Home Assignment</b></p> <ul style="list-style-type: none"> <li>• <b>Task 1</b></li> <li>• <b>Task 2</b></li> <li>• <b>Task 3</b></li> </ul> <p><u><i>Details may be seen at Annexur e-I</i></u></p>
Week 2	Identity Services in Windows Server	<ul style="list-style-type: none"> <li>• <b>Success stories</b> ( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>This module introduces identity services and describes Active Directory Domain Services (AD DS) in a Windows Server environment. The module describes how to deploy domain controllers in AD DS, as well as the Azure Active Directory (AD) and the benefits of integrating Azure AD with AD DS. The module also covers Group Policy basics and how to configure group policy objects (GPOs) in a domain environment. Finally, the modules describes the role of Active Directory certificate services and certificate usage.</p> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>• Overview of AD DS</li> <li>• Deploying Windows Server domain controllers</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Task 4</b></li> <li>• <b>Task 5</b></li> <li>• <b>Task 6</b></li> </ul> <p><u><i>Details may be seen at Annexur e-I</i></u></p>



		<ul style="list-style-type: none"> <li>• Overview of Azure AD</li> <li>• Implementing Group Policy</li> <li>• Overview of Active Directory Certificate Services</li> </ul>	
<b>Week 3</b>	<b>Network Infrastructure services in Windows Server</b>	<ul style="list-style-type: none"> <li>• <b>Motivational Lecture</b>( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>This module describes how to implement core network infrastructure services in Windows Server. The modules covers how to deploy, configure and manage DNS and IPAM. The modules also describe how to use Remote Access Services.</p> <p>Students are :</p> <ul style="list-style-type: none"> <li>• Understanding Deploying and managing DHCP</li> <li>• Understanding Deploying and managing DNS services</li> <li>• Understanding ,Deploying and managing IPAM</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Task 7</b></li> <li>• <b>Task 8</b></li> </ul> <p><u>Details may be seen at Annexur e-I</u></p>
<b>Week 4</b>	<b>File Servers and Storage management in Windows Server</b>	<ul style="list-style-type: none"> <li>• <b>Success stories</b> ( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>This module describes how to configure file servers and storage in Windows Server. The module covers file sharing and deployment of Storage Spaces technology. The module describes how to implement data deduplication, iSCSI based storage in Windows Server, and finally, how to deploy DFS.</p> <p>Students are introduced to :</p> <ul style="list-style-type: none"> <li>• Volumes and file systems in Windows Server</li> <li>• Implementing sharing in Windows Server</li> <li>• Implementing Storage Spaces in Windows Server</li> <li>• Implementing Data Deduplication</li> <li>• Implementing iSCSI</li> <li>• Deploying Distributed File System</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Task 9</b></li> <li>• <b>Task 10</b></li> <li>• <b>Task 11</b></li> </ul> <p><u>Details may be seen at Annexur e-I</u></p> <p><b>Monthly Test 1</b></p>
<b>Week 5</b>	<b>Hyper-V virtualization and containers in Windows Server</b>	<ul style="list-style-type: none"> <li>• <b>Motivational Lecture</b>( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>This modules describes how to implement</p>	<ul style="list-style-type: none"> <li>• <b>Task 12</b></li> <li>• <b>Task 13</b></li> </ul> <p><u>Details may be</u></p>

		<p>and configure Hyper-V VMs and containers. The module covers key features of Hyper-V in Windows Server, describes VM settings, and how to configure VMs in Hyper-V. The module also covers security technologies used with virtualization, such as shielded VMs, Host Guardian Service, admin-trusted and TPM-trusted attestation, and KPS.</p> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>• Hyper-V in Windows Server</li> <li>• Configuring VMs</li> <li>• Securing virtualization in Windows Server</li> <li>• Containers in Windows Server</li> <li>• Overview of Kubernetes</li> </ul>	<p><u>seen at Annexure-I</u></p>
Week 6	High Availability in Windows Server	<ul style="list-style-type: none"> <li>• <b>Success stories</b> ( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>This module describes current high availability technologies in Windows Server. The module describes failover clustering and considerations for implementing it, and how to create and configure failover clustering. The module also explains stretch clusters and options for achieving high availability with Hyper-V VMs</p> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>• Planning for failover clustering implementation</li> <li>• Creating and configuring failover cluster</li> <li>• Overview of stretch clusters</li> </ul> <p>High availability and disaster recovery solutions with Hyper-V VMs</p>	<ul style="list-style-type: none"> <li>• <b>Task 14</b></li> <li>• <b>Task 15</b></li> <li>• <b>Task 16</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p>
Week 7	Disaster recovery in Windows Server	<ul style="list-style-type: none"> <li>• <b>Motivational Lecture</b>( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>This module describes disaster recovery technologies in Windows Server and how to implement them. The module covers how to configure and use Hyper-V Replica and describes Azure Site Recovery. The module also covers how to implement Windows Server backup and describes the</p>	<ul style="list-style-type: none"> <li>• <b>Task 17</b></li> <li>• <b>Task 18</b></li> <li>• <b>Task 19</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p>

		<p>Azure Backup service.</p> <ul style="list-style-type: none"> <li>• Hyper-V Replica</li> <li>• Backup and restore infrastructure in Windows Server</li> </ul>	
<b>Week 8</b>	<b>Windows Server security</b>	<ul style="list-style-type: none"> <li>• <b>Success stories</b> ( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>This module describes Windows Server security features and how to implement them. The module covers credentials used in Windows Server and explains how to implement privileged access protection. In addition to describing methods and technologies for hardening Windows Server security, the module explains how to configure Just Enough Administration (JEA) and how to secure SMB traffic. Finally, the module covers Windows Update, its deployment and management options.</p> <ul style="list-style-type: none"> <li>• Credentials and privileged access protection in Windows Server</li> <li>• Hardening Windows Server</li> <li>• Just Enough Administration in Windows Server</li> <li>• Securing and analyzing SMB traffic</li> <li>• Windows Server update management</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Task 20</b></li> <li>• <b>Task 21</b></li> <li>• <b>Task 22</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p> <p><b>Monthly Test 2</b></p>
<b>Week 9</b>	<b>Remote Desktop Services in Windows Server</b>	<ul style="list-style-type: none"> <li>• <b>Motivational Lecture</b>( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>This module describes key Remote Desktop Protocol (RDP) and Virtual Desktop Infrastructure (VDI) features in Windows Server. The modules covers how to deploy session-based desktops and describes personal and poled virtual desktops. Students are introduced to:</p> <ul style="list-style-type: none"> <li>• Remote Desktop Services Overview</li> <li>• Configuring a session-based desktop deployment</li> <li>• Overview of personal and pooled virtual desktops</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Task 23</b></li> <li>• <b>Task 24</b></li> <li>• <b>Task 25</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p>
<b>Week 10</b>	<b>Remote access and web services</b>	<ul style="list-style-type: none"> <li>• <b>Success stories</b> ( For further detail please see Page No: 3&amp; 4)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Task 26</b></li> <li>• <b>Task 27</b></li> </ul>

	<b>in Windows Server</b>	<p>This module describes how to implement virtual private networks (VPNs), Network Policy Server (NPS), and Microsoft Internet Information Services (IIS). The module provides an overview of remote access services and describes Always On VPN functionality, as well as how to configure NPS and Web Server (IIS) in Windows Server.</p> <ul style="list-style-type: none"> <li>• Overview of RAS in Windows Server</li> <li>• Implementing VPNs</li> <li>• Implementing NPS</li> <li>• Implementing Always On VPN</li> <li>• Implementing Web Server in Windows Server</li> </ul>	<p>• <b>Task 28</b></p> <p><u>Details may be seen at Annexure-I</u></p>
<b>Week 11</b>	<b>Monitoring, performance, and troubleshooting</b>	<ul style="list-style-type: none"> <li>• <b>Motivational Lecture</b>( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>This module describes how to implement service and performance monitoring, and apply troubleshooting in Windows Server. The module highlights monitoring tools and describes how to monitor performance, including event logging and how to perform event logging monitoring for troubleshooting purposes.</p> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>• Overview of Windows Server monitoring tools</li> <li>• Using Performance Monitor</li> <li>• Monitoring event logs for troubleshooting</li> </ul>	<p>• <b>Task 29</b></p> <p><u>Details may be seen at Annexure-I</u></p>
<b>Week 12</b>	<b>Upgrade and migration in Windows Server</b>	<ul style="list-style-type: none"> <li>• <b>Success stories</b> ( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>This module describes how to perform upgrades and migrations for AD DS, Storage, and Windows Server. The module covers tools to use for AD DS migration. The module also covers the Storage Migration Service, and finally, Windows Server migration tools and usage scenarios.</p> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>• AD DS migration</li> <li>• Storage Migration Service</li> </ul>	<p>• <b>Task 30</b></p> <p><u>Details may be seen at Annexure-I</u></p>

		<ul style="list-style-type: none"> <li>Windows Server migration tools</li> </ul>	
	Build your CV	<ul style="list-style-type: none"> <li><b>Success stories</b> ( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>Download professional CV template from any good site (<a href="https://www.coolfreecv.com">https://www.coolfreecv.com</a> or relevant)</p> <ul style="list-style-type: none"> <li>Add Personal Information</li> <li>Add Educational details</li> <li>Add Experience/Portfolio</li> <li>Add contact details/profile links</li> </ul>	
<b>Week 13</b>	<b>Midterm</b>		
<b>Week 14</b>	Installing Red Hat Enterprise Linux Server	<ul style="list-style-type: none"> <li><b>Success stories</b> ( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>Understanding Server Requirements</li> <li>Performing a Basic Installation</li> <li>Installing with Custom Partitioning</li> <li>Logging into the Server</li> <li></li> </ul>	<ul style="list-style-type: none"> <li><b>Home Assignment</b></li> <li><b>Task 31</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p>
<b>Week 15</b>	Essential File Management Tools	<ul style="list-style-type: none"> <li><b>Motivational Lecture</b>( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>Essential File Management Tasks</li> <li>Finding Files</li> <li>Understanding Mounts</li> <li>Understanding Links</li> <li>Working with Links</li> <li>Working with tar</li> <li>Working with Compressed Files</li> </ul>	<ul style="list-style-type: none"> <li><b>Task 32</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p>
	Create an account profile on Fiverr (at least two gigs) and Up work	Create an account by following these steps: Step 1: Personal Info Step 2: Professional Info Step 3: Linked Accounts Step 4: Account Security	<ul style="list-style-type: none"> <li></li> </ul>
<b>Week 16</b>	Connecting to a RHEL/Linux Server	<ul style="list-style-type: none"> <li><b>Success stories</b> ( For further detail please see Page No: 3&amp; 4)</li> </ul> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>Understanding the Root User</li> <li>Logging in to the GUI</li> <li>Logging in to the Console</li> <li>Understanding Virtual Terminals</li> </ul>	<ul style="list-style-type: none"> <li><b>Task 33</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p>

		<ul style="list-style-type: none"> <li>Switching Between Virtual Terminals</li> <li>Using su to Work as Another User</li> <li>Using sudo to Perform Administrator Tasks</li> <li>Using ssh to Log in Remotely</li> </ul>	<b>Monthly Test 3</b>
<b>Week 17</b>	<b>Managing Users and Groups</b>	<ul style="list-style-type: none"> <li><b>Motivational Lecture</b>( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>Understanding the Need for User Accounts</li> <li>Understanding User Properties</li> <li>Creating and Managing Users</li> <li>Managing User Default Settings</li> <li>Understanding /etc/passwd and /etc/shadow</li> <li>Understanding Group Membership</li> <li>Creating and Managing Groups</li> <li>Managing Password Properties</li> </ul>	<ul style="list-style-type: none"> <li><b>Task 34</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p>
<b>Week 18</b>	<b>Managing Permissions</b>	<ul style="list-style-type: none"> <li><b>Success stories</b> ( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>Understanding Ownership</li> <li>Changing File Ownership</li> <li>Understanding Basic Permissions</li> <li>Managing Basic Permissions</li> <li>Understanding umask</li> <li>Understanding Special Permissions</li> <li>Managing Special Permissions</li> <li>Understanding ACLs</li> <li>Managing ACLs</li> <li>Troubleshooting Permissions</li> </ul>	<ul style="list-style-type: none"> <li><b>Task 35</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p> <ul style="list-style-type: none"> <li><b>Monthly Test 5</b></li> </ul>
<b>Week 19</b>	<b>Managing Processes</b>	<ul style="list-style-type: none"> <li><b>Motivational Lecture</b>( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>Understanding Ownership</li> <li>Changing File Ownership</li> <li>Understanding Basic Permissions</li> <li>Managing Basic Permissions</li> <li>Understanding umask</li> <li>Understanding Special Permissions</li> <li>Managing Special Permissions</li> <li>Understanding ACLs</li> <li>Managing ACLs</li> <li>Troubleshooting Permissions</li> </ul>	<ul style="list-style-type: none"> <li><b>Task 36</b></li> </ul> <p><u>Details may be seen at Annexure-I</u></p>
<b>Week 20</b>	<b>Managing Storage</b>	<ul style="list-style-type: none"> <li><b>Success stories</b> ( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul>	<ul style="list-style-type: none"> <li><b>Task 37</b></li> </ul>

		<ul style="list-style-type: none"> <li>• Understanding Disk Layout</li> <li>• Understanding Linux Storage Options</li> <li>• Understanding GPT and MBR Partitions</li> <li>• Creating Partitions with parted</li> <li>• Creating MBR Partitions with fdisk</li> <li>• Understanding File System Differences</li> <li>• Making and Mounting File Systems</li> <li>• Mounting Partitions through /etc/fstab</li> <li>• Managing Persistent Naming Attributes</li> <li>• Managing Systemd Mounts</li> <li>• Managing XFS File Systems</li> <li>• Creating a Swap Partition</li> </ul>	<u>Details may be seen at Annexure-I</u>  <b>Monthly Test</b> <b>4</b>
<b>Week 21</b>	<b>Employable Project/Assignment (6 weeks i.e. 21-26) in addition of regular classes.</b> <b>OR</b> <b>On job training ( 2 weeks)</b>	<ul style="list-style-type: none"> <li>• Guidelines to the Trainees for selection of students employable project like final year project (FYP)</li> <li>• Assign Independent project to each Trainee</li> <li>• A project based on trainee's aptitude and acquired skills.</li> <li>• Designed by keeping in view the emerging trends in the local market as well as across the globe.</li> <li>• The project idea may be based on Entrepreneur.</li> <li>• Leading to the successful employment.</li> <li>• The duration of the project will be 6 weeks</li> <li>• Ideas may be generated via different sites such as:  <a href="https://1000projects.org/">https://1000projects.org/</a>  <a href="https://nevonprojects.com/">https://nevonprojects.com/</a>  <a href="https://www.freestudentprojects.com/">https://www.freestudentprojects.com/</a>  <a href="https://technofizi.net/best-computer-science-and-engineering-cse-project-topics-ideas-for-students/">https://technofizi.net/best-computer-science-and-engineering-cse-project-topics-ideas-for-students/</a> </li> <li>• Final viva/assessment will be conducted on project assignments.</li> <li>• At the end of session the project will be presented in skills competition</li> <li>• The skill competition will be conducted on zonal, regional and National level.</li> <li>• The project will be presented in front of Industrialists for commercialization</li> <li>• The best business idea will be placed in NAVTTC business incubation center for commercialization.</li> </ul> <p>-----</p>	

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<b>Week 22</b>	<b>Capstone project</b>	<p>Students are provided with details regarding a capstone project that they are required to complete in order to showcase their learning. The project should ideally consist of the following deliverables:</p> <ol style="list-style-type: none"> <li>1. Design brief/description outlining their project</li> <li>2. Research collected during the project</li> <li>3. Rough sketches, either hand drawn or digitally created that showcase their design process</li> <li>4. Professionally presented main body of artwork at the end of the course</li> </ol> <p>Notes for the Trainer/Teacher:</p> <ul style="list-style-type: none"> <li>• It's important that each student receives a separate/independent project based on their strengths and interests. This will reinforce their motivation and determine their aptitude towards specific design fields.</li> <li>• Each project should be designed keeping future design trends as well as current market demands in mind</li> <li>• The duration for the completion of the project is 4 weeks</li> </ul> <p>It's important to reiterate the value of these projects as each student will later be able to showcase their creative effort in the real world market, giving them leverage over others for better employment.</p> <p>Ideas for projects may be generated via</p>	<b>Monthly Test 6</b>



		<p>different sites such as:  <a href="https://1000projects.org/">https://1000projects.org/</a>  <a href="https://benahce.com/">https://benahce.com/</a>  <a href="https://www.freestudentprojects.com/">https://www.freestudentprojects.com/</a></p>	
<b>Week 23</b>	<b>Introduction to freelancing</b>	<ul style="list-style-type: none"> <li>• <b>Motivational Lecture</b>( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>• the concept of freelancing</li> <li>• how to become a freelance and create a sustaining income</li> <li>• pros and cons of freelancing</li> <li>• the ethical and professional way of becoming a productive freelancer</li> <li>• resources available for freelancing in the field of design</li> <li>• how to join freelancing sites</li> <li>• the process of creating a freelancing profile</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Task 38</b></li> </ul> <p><u><i>Details may be seen at Annexure-I</i></u></p>
<b>Week 24</b>	<b>Managing Advanced Storage</b>	<ul style="list-style-type: none"> <li>• <b>Success stories</b> ( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>• Understanding LVM, Stratis, and VDO</li> <li>• Understanding LVM Setup</li> <li>• Creating an LVM Logical Volume</li> <li>• Understanding Device Mapper and LVM Device Names</li> <li>• Resizing LVM Logical Volumes</li> <li>• Understanding Stratis Setup</li> <li>• Creating Stratis Volumes</li> <li>• Managing Stratis Storage Features</li> <li>• Understanding VDO</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Task 39</b></li> </ul> <p><u><i>Details may be seen at Annexure</i></u></p>
<b>Week 25</b>	<b>Preparing your portfolio</b>	<ul style="list-style-type: none"> <li>• <b>Motivational Lecture</b>( <i>For further detail please see Page No: 3&amp; 4</i>)</li> </ul> <p>Students are introduced to:</p> <ul style="list-style-type: none"> <li>• the concept of design portfolios</li> <li>• the concept of present design work/projects in a professional manner</li> <li>• websites that provide free portfolio hosting such as Behance and Dribbble</li> <li>• creating a portfolio</li> <li>• how to select work for presenting in your portfolio</li> </ul>	<b>Final Assessment</b>
<b>Week 26</b>	<b>Entrepreneurship and Final Assessment in project</b>	<ul style="list-style-type: none"> <li>• <b>Success stories</b> ( <i>For further detail please see Page No: 3&amp; 4</i>)</li> <li>• Job Market Searching</li> <li>• Self-employment</li> </ul>	

		<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Fundamentals of Business Development</li> <li>• Entrepreneurship</li> <li>• Startup Funding</li> <li>• Business Incubation and Acceleration</li> <li>• Business Value Statement</li> <li>• Business Model Canvas</li> <li>• Sales and Marketing Strategies</li> <li>• How to Reach Customers and Engage CxOs</li> <li>• Stakeholders Power Grid</li> <li>• RACI Model, SWOT Analysis, PEST Analysis</li> <li>• SMART Objectives</li> <li>• OKRs</li> <li>• Cost Management (OPEX, CAPEX, ROCE etc.)</li> <li>• Final Assessment</li> </ul>	
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## Tasks For Certificate in Computer Graphics and Video Editing

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Task No.	Task	Description	Week
1.	Search Top Pakistani Freelancers	Search any three freelancing sites(Fiverr, Upwork, Guru etc.) and list down top 5 profiles related to your course	Week 1
2.	Installation of Server on using VMware or Virtual Box	Deploying and configuring Server Core	
3.	Activating Remote administration	Implementing and using remote server administration	
4.	Deploying a new domain controller on Server Core	<ul style="list-style-type: none"> <li>AD DS in a Windows Server 2019 environment</li> <li>Domain controllers in AD DS</li> </ul>	Week-2
5.	Configuring Group Policy	<ul style="list-style-type: none"> <li>Group Policy basics and configure GPOs in a domain environment</li> </ul>	Week-2
6.	Deploying and using certificate services	<ul style="list-style-type: none"> <li>Active Directory certificate services and certificate usage</li> </ul>	Week-2
7.	Deploying and configuring DHCP.	<ul style="list-style-type: none"> <li>In Windows server 2019 deploy and configure DHCP service.</li> </ul>	Week 3
8.	Deploying and configuring DNS	<ul style="list-style-type: none"> <li>In Windows server 2019 deploy and configure DNS service.</li> </ul>	
9.	Implementing Data Deduplication	<ul style="list-style-type: none"> <li>Install Data Deduplication by using Server Manager</li> </ul>	Week 4

10.	Configuring iSCSI storage	<ul style="list-style-type: none"> <li>Configuring iSCSI storage using Server Manager in windows server 2019</li> </ul>	Week 4
11.	Configuring redundant storage spaces)	<ul style="list-style-type: none"> <li>Deploy Storage Spaces on a stand-alone server in windows server 2019</li> </ul>	
12.	Creating and configuring VMs	Installing Hyper-V configuring VMs in windows server 2019 VM settings and deploy and configure VMs in Hyper-V	Week 5
13.	Installing and configuring containers	Container host deployment: Windows Server 2019	Week 5
14.	Configuring iSCSI storage	Install and Configure iSCSI Target on Windows Server 2019	Week 6
15.	Configuring a failover cluster	create a Failover Cluster in Windows Server 2019 <a href="https://www.kindsonthegenius.com/windows-server-2019-failover-cluster-installation-and-setup-step-by-step/">https://www.kindsonthegenius.com/windows-server-2019-failover-cluster-installation-and-setup-step-by-step/</a>	
16.	Deploying and configuring a highly available file server	Deploying a Highly Available Windows File Server on windows server 2019	
17.	Validating the deployment of the highly available file server		Week 7
18.	Implementing Hyper-V Replica	Set up the Hyper-V hosts Set up the firewall Enable virtual machine replication	
19.	Implementing backup and restore with Windows Server Backup	Install Windows Server Backup Feature/Role In Server 2019	

20.	<b>Configuring Windows Defender Credential Guard</b>	<ul style="list-style-type: none"> <li>Configure Windows Defender Credential Guard in windows 2019</li> </ul>	<b>Week 8</b>
21.	<b>Locating problematic accounts</b>	<ul style="list-style-type: none"> <li>Locate and reconfigure accounts with passwords that don't expire in windows server2019</li> </ul>	
22.	<b>Implementing LAPS</b>	<ul style="list-style-type: none"> <li>Prepare OU and computer accounts for LAPS (Local Administrator Password Solution) in windows 2019 server</li> </ul>	<b>Week 8</b>
23.	<b>Implementing RDS.</b>	Configure Remote Desktop Services – Using the GUI in windows server 2019	<b>Week 9</b>
24.	<b>Configuring RemoteApp collection settings</b>	Create a pooled desktop session collection Create a personal desktop session collection Publish RemoteApp programs In windows server 2019	
25.	<b>Configuring a virtual desktop template</b>	Install and configure VDI in server 2019 using following link  <a href="https://rdr-it.com/en/vdi-installation-and-configuration-with-windows-server/5/">https://rdr-it.com/en/vdi-installation-and-configuration-with-windows-server/5/</a>	

26.	<b>Implementing Web Application Proxy</b>	Install and Configure the Web Application Proxy Server	<b>Week 10</b>
27.	<b>Implementing VPN in Windows Server</b>	Set up L2TP/IPSec VPN on Windows Server 2019	
28.	<b>Deploying and Configuring Web Server</b>	Install and Configure Web Deploy on IIS 8.0	<b>Week 10</b>
29.	<b>Monitoring tools in Windows Server</b>	<ul style="list-style-type: none"> <li>• Monitor and troubleshoot Windows Server in windows 2019</li> </ul>	<b>Week 11</b>
30.	<b>Migrate server workloads</b>	<ul style="list-style-type: none"> <li>• Make a plan to migrate the Active directory services</li> <li>•</li> </ul>	<b>Week 12</b>
31.	<b>Linux Installation</b>	<ul style="list-style-type: none"> <li>• Install Linux(Redhat)</li> </ul>	<b>Week 14</b>
32.	<b>Soft Links and Hard Links</b>	<ul style="list-style-type: none"> <li>• Using Command lines make soft and hard links</li> </ul>	<b>Week 15</b>
33.	<b>Switching between root user and normal user</b>	<ul style="list-style-type: none"> <li>• Login to the linux machine and switch between normal user to root user</li> </ul>	<b>Week 16</b>
34.	<b>User and Groups</b>	<ul style="list-style-type: none"> <li>• Create user in linux and make part of administrator group</li> </ul>	<b>Week 17</b>
35.	<b>Permission on File</b>	Create a File and make the following permission RWX	<b>Week 18</b>
36.	<b>Process in linux</b>	<ul style="list-style-type: none"> <li>• Display foreground and background process in Linux using commands.</li> </ul>	<b>Week 19</b>

<b>37.</b>	<b>Swap Area</b>	Using command line in Linux create swap area.	<b>Week 20</b>
<b>38.</b>	<b>Search projects</b>	Search the projects on the free lancing web sites	<b>Week 23</b>
<b>39.</b>	<b>VDO Volumes</b>	Configuring VDO Volumes in linux	<b>Week 24</b>

## **Computer Graphics and Video Editing**

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**What is freelancing and how you can make money online - BBCURDU**

<https://www.youtube.com/watch?v=9jCJN3Ff0kA>

**Hisham Sarwar Motivational Story | Pakistani Freelancer**

[https://www.youtube.com/watch?v=CHm\\_BH7xAXk](https://www.youtube.com/watch?v=CHm_BH7xAXk)

**21 Yr Old Pakistani Fiverr Millionaire | 25-35 Lakhs a Month Income | Interview**

<https://www.youtube.com/watch?v=9WrmYYhr7S0>

**Success Story of a 23 Year - Old SEO Expert | How This Business Works | Urdu Hindi Punjabi**

<https://www.youtube.com/watch?v=tlQ0CWgszl0>

**Failure to Millionaire - How to Make Money Online | Fiverr Superhero Aaliyaan Success Story**

<https://www.youtube.com/watch?v=d1hocXWSpus>



**SUCCESS STORY**

S. No	Key Information	Detail/Description
1.	<b>Self &amp; Family background</b>	<p><b>Muhammad Ramzan</b>, who lives in Jhung , is an example of how hard work and perseverance can reap rich rewards when bidding for projects online.</p> <p>Currently he is running Mature Resources Global Technologies Pvt. He had already started a small business to help pay for his college education, so he was nervous and apprehensive about the decision. "I gave myself two or three months at most. If I didn't succeed, then I would go back to running the business as it was showing potential," he says.</p> <p><b>If at first you don't succeed, try try again</b></p>
2.	<b>How he came on board NAVTTC Training/ or got trained through any other source</b>	Certification in graphic designing from STEPS(NAVTTC partner institute)
3.	<b>Post training activities</b>	<p><b>Muhammad Ramzan</b> area of expertise is in <b>System Administration</b>.</p> <p>"I needed to understand what worked, so I read blogs, participated in forums, and analysed profiles of successful freelancers. It was an uphill struggle, but I didn't want to give up," he explains.</p> <p><b>Muhammad Ramzan</b> says he understands why clients would be apprehensive giving projects to untested freelancers. They literally have hundreds of options to choose from, he explains, and to give a project to someone with no experience requires a strong leap of faith.</p> <p>A slow stream of projects started to come <b>Muhammad Ramzan</b> way. Within a few months he was landing an average of a hundred projects every month, with a large number of repeat clients.</p>
4.	<b>Message to others (under training)</b>	<p>Take the training opportunity seriously</p> <p>Impose self-discipline and ensure regularity</p> <p>Make Hard work pays in the end so be always ready for the same.</p>

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**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.

\* *The online success stories of renowned professional can also be obtained from **Annex-II***

## **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. Take 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.