

## NSQF QUALIFICATION FILE

Approved in 21st NSQC – NCVET, Dated: 28<sup>th</sup> July, 2022

NCVET Code

2022/ITES/NIELIT/06121

### CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

#### Name and address of submitting body:

NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY  
NIELIT Bhawan, Plot No. 3, PSP Pocket, Sector-8,  
Dwarka, New Delhi-110077

#### Name and contact details of individual dealing with the submission

**Name:** Milind Kshirsagar  
**Position in the organisation:** Sr. Tech. Officer  
**Address if different from above:** NIELIT, Aurangabad- 431004  
**Tel number(s):** 0240-2982021 Ext. 107,  
+919822933728  
**E-mail address:** milind@nielit.gov.in

#### List of documents submitted in support of the Qualifications File

1. Annexure 1: Model Curriculum
2. Annexure 2: Evidence of need

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### SUMMARY

1	Qualification Title	<b>CHM- T(Computer Hardware Maintenance-Technician) O-Level</b>
2	Qualification Code, if any	2022/ITES/NIELIT/06121
3	NCO code and occupation	3114.0100: Electronics Technician
4	Nature and purpose of the qualification (Please specify whether qualification is short term or long term)	<b>Nature</b> The conception of a new scheme under NIELIT for hardware courses is a result of the amalgamation of experience of running the existing NIELIT Scheme in computers and pioneer industry professionals like Intel. The objective of the courses is to generate quality manpower for Hardware in the field of Information Technology (IT) by utilizing the facilities and expertise available with training institutes/ organizations in the non-formal sector. Eligibility to enrol is 10+2 or ITI Certificate (One Year), second year of a Government recognized polytechnic engineering diploma course after class 10 or direct applicants 10+2 or ITI Certificate (One Year) after class 10, followed by one-year relevant experience or pass in the NCVT-DP&CS (Data Preparation & Computer Software) Examination, conducted by DGE&T (Govt. of India). The Objective of the CHM-O level is to train the candidates in Computer printer, all purpose (copier, fax, scanner etc.) hardware, networking and it's troubleshooting. The CHM-O Level course prepares a, 10+2/ Diploma/ graduate/ other degree Qualifiers, with basic knowledge needed such as computer hardware and peripherals for installation, troubleshooting and maintenance including system software management and its back up and to

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		<p>undertake disaster prevention, diagnosis and rectification of faults besides personality development and communication skills.</p> <p><b>Purpose:</b></p> <ul style="list-style-type: none"> <li>❖ To train incumbents for local hardware and networking support as usage of computers and networking has become an unavoidable part of any organisation.</li> <li>❖ As computer hardware and peripherals for installation, troubleshooting and maintenance including system software management and its back up and to undertake disaster prevention, diagnosis and rectification of faults besides personality development and communication skills.</li> <li>❖ Qualification is a short-term course</li> </ul>
5	<b>Body/bodies which will award the qualification</b>	National Institute of Electronics and Information Technology, Dr. B. A. M. University Campus, Aurangabad 431004.
6	<b>Body which will accredit providers to offer courses leading to the qualification</b>	National Institute of Electronics and Information Technology
7	<b>Whether accreditation/affiliation norms are already in place or not , if applicable (if yes, attach a copy)</b>	Yes. Available at the link: <a href="https://www.nielit.gov.in/content/nsqf">https://www.nielit.gov.in/content/nsqf</a>
8	<b>Occupation(s) to which the qualification gives access</b>	Computer Hardware Technician, Computer Networking Technician, Office Automation Maintenance & Technical Support Technician and Customer Care (erection and commissioning) Support Technician.
9	<b>Job description of the occupation</b>	Computer hardware and peripherals and networking installation, troubleshooting and maintenance including system

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		<p>software management and its back up and to undertake disaster prevention, diagnosis and rectification of related faults.</p> <p>The incumbent shall be serving for preventive as well corrective PC, laptop, networking maintenance and networking administration within premises. He can raise the career to Chief Information Officer by gaining experience.</p>
10	<b>Licensing requirements</b>	NA
11	<b>Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)</b>	NA
12	<b>Level of the qualification in the NSQF</b>	Level 4
13	<b>Anticipated volume of training/learning required to complete the qualification</b>	<p>600</p> <p>Theory:180</p> <p>Practical:300</p> <p>Project: 60</p> <p>ES: 60</p>
14	<b>Indicative list of training tools required to deliver this qualification</b>	<ul style="list-style-type: none"> <li>● Desktop Trainer Kit</li> <li>● Laptop Trainer Kit</li> <li>● Keyboard, Wireless Keyboard, Optical Mouse Trainer Kit</li> <li>● Dot Matrix Printer Trainer Kit</li> <li>● Ink-Jet Printer trainer Kit</li> <li>● Laser Printer Trainer Kit</li> <li>● ALL-In-One MFD (Multi Function Device) Trainer Kit</li> <li>● Hub, Bridge, Switch, Router, Gateway Trainer Kit</li> <li>● Computer Network Cables Display Board</li> <li>● Function Generator</li> <li>● Breadboard and Power Supply</li> <li>● Variable Power Supply (0-15Volt, 2Amp)</li> <li>● Transformer Input-230V, 50Hzs, Output 9-0-9Volt</li> </ul>

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		<ul style="list-style-type: none"><li>● IC 741, IC7805, IC7404, IC7408, IC7432, IC7486, IC7400, IC74LS02, IC74266,</li><li>● IC74153, IC74139, IC74LS669, IC74LS194</li><li>● Digital Multi-Meter</li><li>● Soldering Station</li><li>● Electronic Tool Kit Set</li><li>● Digital Oscilloscope</li></ul> <p>Multi-meter, Screwdriver set, pliers, basic networking cable kit (tools), crimping tools, PC discrete accessories/ components/ units, laptop/ PC modular training kit (optional), soldering/ desoldering station etc. Institute may have modern teaching aids like, LCD/ video projectors, audio-visuals aids etc. Related licensed software Linux OS – Ubuntu (Desk Top and Server), PC Diagnostic Software – PC Doctor, Microsoft Windows Server – Latest Edition Windows 2000 Onwards, Microsoft OS – Latest Edition Windows 10 Onwards.</p>
<b>15</b>	<b>Entry requirements and/or recommendations and minimum age</b>	<p>12th Pass Or 10th + 2 Years ITI Certificate in relevant field Or 10th + 1 Year ITI Certificate with one year of experience post qualification in the relevant field. Or Successful completion of the second year of a Government recognized polytechnic engineering diploma course after class 10, Training of CHM 'O' Level course concurrently during the third year of the said 3 years Polytechnic engineering diploma course. The certificate of CHM T 'O' level will be awarded only after successful</p>

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		completion of the polytechnic engineering diploma. Or NSQF Level 3 Certified with 2 Years of experience.
16	<b>Progression from the qualification (Please show Professional and academic progression)</b>	<p><b>Professional:</b> Trainee Engineer Support -&gt;Service Engineer -&gt; Technical Support Engineer -&gt; Network Engineer -&gt; Network Administrator -&gt; Network Analyst -&gt; Chief Information Officer.</p> <p><b>Academic:</b> After completion of this course a candidate may opt for advance course CHM A level.</p>
17	<b>Arrangements for the Recognition of Prior learning (RPL)</b>	Candidates undergoing training will only be assessed.
18	<b>International comparability Where known (research evidence to be provided)</b>	NA
19	<b>Date of planned review of the Qualification.</b>	28/07/2025
20	<b>Formal structure of qualification (Table below)</b>	Level 4

Module	Learning Hours (Theory)	Learning Hours (Practical/ Tutorials/ Project)	Total Learning Hours
<b>Basics of Computer Hardware</b>	45	75	120
<b>Peripherals and Data Storage Devices</b>	45	75	120
<b>Syllabus of Computer Networking and Hardware</b>	45	75	120

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<b>Working and Maintenance of Systems</b>	45	75	120
<b>Sub-total</b>	180	300	480
<b>Employability skills</b>	60		60
<b>OJT</b>	60		60
<b>Total</b>	<b>600</b>		

### SECTION 1

#### ASSESSMENT

21	<b>Body/ Bodies which will carry out assessment:</b>  NIELIT
22	<b>How will RPL assessment be managed and who will carry it out?</b>  Candidates undergoing training will only be assessed.
23	<b>Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.</b>  The theory examination for each module under the third revised syllabus would be for a duration of three hours and the total marks for each theory paper would be 100. One Practical examination of three hours duration and 100 marks would be conducted. The first examination with the revised syllabus will be held as per notification issued by NIELIT in this regard.  Dates for the various activities related with examinations will be announced on NIELIT website, well in advance of the examinations.  Laboratory/ Practical work will be conducted at Institutions/ organizations, which are running the course. NIELIT will be responsible for holding the examination for the theory and practical both for the students from Accredited Centres and direct candidates.  Pass Percentage  To qualify a module, a candidate must have obtained at least 50% in each theory and practical examination. A successful project complete certificate

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is mandatory for student to qualify the course. Following table shows the marks distribution.		
Module Code	Module	Maximum Marks
CHM1-R3	Basics of Computer Hardware	100
CHM2-R3	Peripherals and Data Storage Devices	100
CHM3-R3	Computer Networking and Hardware	100
CHM4-R3	Working and Maintenance of Computer System	100
CHM PR1-R3	Practical Based on all four modules	100
CHM PJ1-R3	Project (Certificate only to qualify CHM 'O' Level)	
Total		500
The marks will be translated into grades, while communicating results to the candidates. The gradation structure is as below: -		
Pass Percentage	Grade	
Failed (<50)	F	
>=50%-54.99%	D	
>=55%-64.99%	C	
>=65%-74.99%	B	
>=75%-84.99%	A	
>=85% and over	S	

### 24. Assessment evidences

#### Title of Component:

Outcomes to be assessed/ NOSs to be assessed	Assessment criteria for the outcome												
<b>Syllabus of Basics of Computer Hardware (CHM1-R3)</b> After completing the module, the incumbent will be able to: <ul style="list-style-type: none"> <li>➤ Acquire confidence in identification of various hardware components viz. Power Supply, Motherboard, Memories and I/O ports.</li> <li>➤ Well versed in Installation and Troubleshooting of Power Supply.</li> <li>➤ Acquire knowledge of Motherboard, Form Factor, and in Depth analysis of Mother Board &amp; its Reliability.</li> </ul>	<b>Module shall be assessed through theory exam, chapter-wise max marks-</b> <table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: left;">Module Unit</th> <th style="text-align: right;">Written Marks (Max.)</th> </tr> </thead> <tbody> <tr> <td>Power Supplies</td> <td style="text-align: right;">20</td> </tr> <tr> <td>Motherboard</td> <td style="text-align: right;">25</td> </tr> <tr> <td>Chipset</td> <td style="text-align: right;">20</td> </tr> <tr> <td>Primary and Secondary Memories</td> <td style="text-align: right;">20</td> </tr> <tr> <td>Buses &amp; I/O Ports</td> <td style="text-align: right;">15</td> </tr> </tbody> </table>	Module Unit	Written Marks (Max.)	Power Supplies	20	Motherboard	25	Chipset	20	Primary and Secondary Memories	20	Buses & I/O Ports	15
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<ul style="list-style-type: none"> <li>➤ Acquire knowledge in basic Principle and Operation of Primary and Secondary Memory.</li> <li>➤ Acquire knowledge of Physical Identification and Working of Intel and AMD Chipset.</li> <li>➤ Acquire knowledge of Bus Definition and Physical Identification and Applications of Ports and Buses on Motherboard.</li> </ul> <p><b>Duration</b> 120 Hours</p>	<p>Total</p> <p>100</p>												
<p><b>Syllabus of Peripherals and Data Storage Devices (CHM2-R3)</b></p> <ul style="list-style-type: none"> <li>➤ After completing the module, the incumbent will be able to:</li> <li>➤ Understand the difference between input and output devices.</li> <li>➤ Understand operation, assembly and Disassembly of Impact and Non Impact Printers etc along with general troubleshooting.</li> <li>➤ Understand operation of various Electronic Display Systems like Electronic Paper, LED Display, LCD Display, Flexible Display, Plasma Display etc.</li> <li>➤ Understand diagnostic tools for problem shooting like Sys-Internals Suite, System Information for Windows (SIW) etc.</li> <li>➤ Develop soft skills for understanding oneself, problem, stress and emotion management and development of leadership quality.</li> </ul> <p><b>Duration</b> 120 Hours</p>	<p><b>Module shall be assessed through theory exam, chapter-wise max marks-</b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><b>Module Unit</b></th> <th style="text-align: right;"><b>Written Marks (Max.)</b></th> </tr> </thead> <tbody> <tr> <td>Mouse, Key Board, Printers</td> <td style="text-align: right;">20</td> </tr> <tr> <td>Display Devices &amp; Data Storage Devices</td> <td style="text-align: right;">30</td> </tr> <tr> <td>Diagnostic Tools</td> <td style="text-align: right;">25</td> </tr> <tr> <td>Soft Skill</td> <td style="text-align: right;">25</td> </tr> <tr> <td style="text-align: right;"><b>Total</b></td> <td style="text-align: right;"><b>100</b></td> </tr> </tbody> </table>	<b>Module Unit</b>	<b>Written Marks (Max.)</b>	Mouse, Key Board, Printers	20	Display Devices & Data Storage Devices	30	Diagnostic Tools	25	Soft Skill	25	<b>Total</b>	<b>100</b>
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<p><b>Syllabus of Computer Networking and Hardware (CHM3-R3)</b></p>	<p><b>Module shall be assessed through theory exam, chapter-wise max marks-</b></p>												

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<p>➤ After completion of the module, the learner is expected to analyze the real life problem of establishing and troubleshooting Computer Networking either wired or wireless. The main emphasis of this module is to have sound knowledge of the Computer Hardware Networking Devices so that the learner will be able to establish Computer Networking in professional manner and also to trouble shoot.</p> <p>➤ Know the various Network Hardware Devices</p> <p>➤ Understand Internet &amp; its uses</p> <p>➤ Know about the Bluetooth Architecture, Protocols, Operation and Applications.</p> <p>➤ Know how to Establishment of Computer Network</p> <p>➤ Diagnose network problem using various Network Software and commands.</p> <p><b>Duration</b></p> <p>➤ 120 Hours</p>	<table border="0"> <thead> <tr> <th style="text-align: left;"><b>Module Unit</b></th> <th style="text-align: right;"><b>Written</b></th> </tr> <tr> <th style="text-align: left;"><b>Marks (Max.)</b></th> <th></th> </tr> </thead> <tbody> <tr> <td>Network Hardware Devices</td> <td></td> </tr> <tr> <td>30</td> <td></td> </tr> <tr> <td>Internet</td> <td></td> </tr> <tr> <td>25</td> <td></td> </tr> <tr> <td>Bluetooth and Wireless Networking</td> <td></td> </tr> <tr> <td>30</td> <td></td> </tr> <tr> <td>Networking Diagnostic Tools</td> <td></td> </tr> <tr> <td>15</td> <td></td> </tr> <tr> <td style="text-align: right;"><b>Total</b></td> <td></td> </tr> <tr> <td></td> <td style="text-align: right;"><b>100</b></td> </tr> </tbody> </table>	<b>Module Unit</b>	<b>Written</b>	<b>Marks (Max.)</b>		Network Hardware Devices		30		Internet		25		Bluetooth and Wireless Networking		30		Networking Diagnostic Tools		15		<b>Total</b>			<b>100</b>
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<p><b>Syllabus of Working and Maintenance of Systems (CHM4-R3)</b></p> <p>➤ After completing the module, the incumbent will be able to:</p> <p>➤ Knowledge of Digital Electronics, Number System, De-Morgan's Theorem</p> <p>➤ Basic knowledge of Combinational and Sequential circuits</p> <p>➤ Understand the hierarchy of Computer and Laptop Hardware, operation and Application of Computer.</p> <p>➤ Knowledge of processors architecture and its operation.</p> <p>➤ Understand the BIOS operation and Setup - CPU Configuration.</p>	<p><b>Module shall be assessed through theory exam, chapter-wise max marks-</b></p> <table border="0"> <thead> <tr> <th style="text-align: left;"><b>Module Unit</b></th> <th style="text-align: right;"><b>Written</b></th> </tr> <tr> <th style="text-align: left;"><b>Marks (Max.)</b></th> <th></th> </tr> </thead> <tbody> <tr> <td>Computer Hierarchy</td> <td style="text-align: right;">20</td> </tr> <tr> <td>Processor</td> <td style="text-align: right;">20</td> </tr> <tr> <td>Laptop</td> <td style="text-align: right;">30</td> </tr> <tr> <td>BIOS, Booting and POST Test</td> <td style="text-align: right;">10</td> </tr> <tr> <td>OS and Application Software</td> <td style="text-align: right;">10</td> </tr> <tr> <td>Virus Removal and Protection</td> <td style="text-align: right;">10</td> </tr> <tr> <td style="text-align: right;"><b>Total</b></td> <td style="text-align: right;"><b>100</b></td> </tr> </tbody> </table>	<b>Module Unit</b>	<b>Written</b>	<b>Marks (Max.)</b>		Computer Hierarchy	20	Processor	20	Laptop	30	BIOS, Booting and POST Test	10	OS and Application Software	10	Virus Removal and Protection	10	<b>Total</b>	<b>100</b>						
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<ul style="list-style-type: none"> <li>➤ Understand the booting process of Desktop and Laptop</li> <li>➤ Understand the POST Test</li> <li>➤ Knowledge of Windows and Linux OS Architecture, operation and Installation.</li> <li>➤ Knowledge of Installation of Application Software</li> </ul> <p><b>Duration</b></p> <ul style="list-style-type: none"> <li>➤ 120 Hours</li> </ul>																							
<p><b>Means of assessment 1</b></p> <p><b>Theory</b></p>	<p>Theory examination shall be conducted as shown below-</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Module</th> <th style="text-align: right;">Module</th> </tr> </thead> <tbody> <tr> <td>Maximum</td> <td></td> </tr> <tr> <td>Code</td> <td></td> </tr> <tr> <td>Marks</td> <td></td> </tr> <tr> <td>CHM1-R3 Basics of Computer Hardware</td> <td style="text-align: right;">100</td> </tr> <tr> <td>CHM2-R3 Peripherals and Data Storage Devices</td> <td style="text-align: right;">100</td> </tr> <tr> <td>CHM3-R3 Computer Networking and Hardware</td> <td style="text-align: right;">100</td> </tr> <tr> <td>CHM4-R3 Working and Maintenance of Computer System</td> <td style="text-align: right;">100</td> </tr> <tr> <td>CHM PR1-R3 Practical Based on all four Modules</td> <td style="text-align: right;">100</td> </tr> <tr> <td>CHM PJ1-R3 Project (Certificate only to qualify CHM 'O' Level)</td> <td style="text-align: right;">Total</td> </tr> <tr> <td></td> <td style="text-align: right;">500</td> </tr> </tbody> </table>	Module	Module	Maximum		Code		Marks		CHM1-R3 Basics of Computer Hardware	100	CHM2-R3 Peripherals and Data Storage Devices	100	CHM3-R3 Computer Networking and Hardware	100	CHM4-R3 Working and Maintenance of Computer System	100	CHM PR1-R3 Practical Based on all four Modules	100	CHM PJ1-R3 Project (Certificate only to qualify CHM 'O' Level)	Total		500
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<p><b>Means of assessment 2 Practical</b></p> <p><b>CHM1-R3 Basics of Computer Hardware</b></p> <ol style="list-style-type: none"> <li>1. How to use Digital Multimeter and its operation.</li> <li>2. Measurement of Resistance, Capacitance and Inductance values using Multimeter.</li> <li>3. How to use C.R.O. and its Operation.</li> <li>4. Measurement of Resistance, Capacitance and Inductance values using C.R.O.</li> </ol>																							

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5. Measurement of Amplitude and Time of an input frequency.
6. Verification of Ohm's Law.
7. Measurement of Series and Parallel connected Resistance values.
8. Measurement of Series and Parallel connected Capacitance values.
9. Measurement of Series and Parallel connected Inductance values.
10. Measurement of Charging and discharging voltage of capacitor with respect to time.
11. Physical Identification of Diode, BJT Transistor and MOSFET.
12. Identification of terminals of Diode, BJT Transistor and MOSFET using Multi-Meter.
13. Identification of faulty Diode, BJT Transistor and MOSFET using Multi-Meter.
14. Identification of faulty Diode, BJT Transistor and MOSFET using C.R.O.
15. Full Wave Rectifier and observe output waveform on C.R.O.
16. Perform operation of Transistor as a switch.
17. To find out one example of each SSI, MSI and LSI VLSI ICs chips with operation of pin details from the datasheet.
18. Design of regulated power supply with filter using IC 7805 with following specifications as
  - Input Voltage 250V, 50Hz and Output Voltage 5V DC
  - Compare calculated and Measured Power delivered by Power supply.
19. Design a SMPS power supply with filter using IC LM2576 with following specifications as
  - Input Voltage 250V, 50Hz and Output Voltage 5V DC
  - Compare calculated and Measured Power delivered by Power supply.
20. Design a Compactor for 5V using IC 741
21. Identification of following on PC Motherboard
  - CPU Socket
  - CPU Fan
  - Heat Sink
  - CPU Fan Connector
  - Power Connector
  - SATA Connector
  - DIMM Memory Slots
  - Super IO Chip
  - BIOS/UEFI Flash Chip
  - North Bridge
  - South Bridge
  - CMOS Backup Battery
  - Integrated Graphics Processor
  - Integrated Audio Codec Chip
  - Integrated Ethernet Chip
  - PCI Slots

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- Integrated Peripherals Connectors like HDMI, USB, WIFI, Audio, COM Port.
22. Disassembly and Assembly of PC SMPS Power Supply
  23. Disassembly, Assembly, Windows OS Installation in Desktop PC.
  24. Installation of Ubuntu Linux OS Installation in Desktop PC.
  25. Installation of Dual OS with Dual Boot Facility (windows and Linux in Desktop PC.
  26. Interfacing of AMD Chipset for processor socket SP3r3.

### CHM2-R3 Peripherals and Data Storage Devices

27. Disassembly, Component Identification and Assembly of 3-Button (with wheel facility) wired optical mouse.
28. Disassembly, Component Identification and Assembly of 3-Button (with wheel facility) wireless optical mouse.
29. Disassembly, Component Identification and Assembly of Dot-Matrix Printer.
30. Disassembly, Component Identification and Assembly of Ink-Jet Printer.
31. Disassembly, Component Identification and Assembly of Laser-Jet Printer.
32. Disassembly, Component Identification and Assembly of Multi-Function Printer.
33. Soldering Practice by connecting LEDs for displaying “NIELIT”.
34. Pin Detail and connection of e-Paper and LED Dot-Matrix Display.
35. Pin Detail and connection of LCD and TFT Display.
36. Pin Detail and connection of Quantum Dot and Flexible Display.
37. With the help of Google Search list 05 no's of Free and Paid PC Diagnostic Tools
38. Pin Details and Working of following Ports
  - HDMI
  - USB
  - WIFI
  - COM
  - LPT
39. Result Analysis of Diagnostic Tools and its Command for Windows OS studied in Theory Class.
40. Result Analysis of Diagnostic Tools and its Command for Ubuntu Linux OS studied in Theory Class.
41. Practical session for developing Communication skills for collaboration which are essential for Technician.
42. Practical Session for developing Successful Negotiation Skills essential for Technician.
43. Practical Session to develop confidence and skills to overcome the barriers for working efficiently and effectively.
44. Practical Session for developing the skill of working in a Team.

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45. Practical Session for developing the skill of Problem Management and Customer Handling.
46. Practical Session for developing the skill of Technical content writing.
47. Practical Session for developing the skill of content writing by viewing videos.
48. Practical Session for developing the skill of Leadership Quality.
49. Practical Session for developing the skill of working in a Team.
50. Practical Session for developing the skill for facing Interview
51. Practical Session for developing the skill of Creative and Innovative Thinking. .

### **CHM3-R3 Computer Networking and Hardware**

52. Physical setup and component identification of Co-axial, UTP and Fiber Optics cables.
53. Disassembly, Component Identification and Assembly of Hub.
54. Disassembly, Component Identification and Assembly of Switch.
55. Disassembly, Component Identification and Assembly of Router.
56. Disassembly, Component Identification and Assembly of wired Access Point.
57. Disassembly, Component Identification and Assembly of Wi-Fi Access Point.
58. Practically identifying the Hardware and Software Components required for establishment of Gateways.
59. NIC Card Driver Installation for Windows OS.
60. NIC Card Driver Installation for Ubuntu OS.
61. Preparation of Cross-Over Network Cable using RJ45 Connector.
62. Preparation of Straight-Through Network Cable using RJ45 Connector
63. Setup 5(PCs) + 1(Server) wired networking using Windows Server 2000 and above and Windows OS on Client using IP and Subnetting.
64. Setup 5(PCs) + 1(Server) wired networking using Ubuntu Linux Server and Ubuntu Linux OS on Client using IP and Subnetting.
65. Setup Login Credentials for accessing and sharing Internet on Windows Network Environment.
66. Setup Login Credentials for accessing and sharing Internet on Ubuntu Linux Network Environment.
67. Setup 5(PCs) + 1(Server) wifi networking using Windows Server 2000 and above and Windows OS on Client using IP and Subnetting.
68. Setup 5(PCs) + 1(Server) wifi networking using Ubuntu Linux Server and Ubuntu Linux OS on Client using IP and Subnetting.
69. Setup 5(PCs) + 1(Server) wired and wireless networking using Windows Server 2000 and above and Windows OS on Client using IP and Subnetting.
70. Setup 5(PCs) + 1(Server) wired and wireless networking using Ubuntu Linux Server and Ubuntu Linux OS on Client using IP and Subnetting.
71. Setup 5(PCs) + 1(Server) mixed wired, wireless networking for Windows and Linux Environment in a single network using IP and Subnetting.

## NSQF QUALIFICATION FILE

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72. Setup Bluetooth Networking between PCs and Android Mobile Phone with resource sharing (Hardware and Software both).
73. Hands on Practice and Result Analysis of the Network Command for Windows OS studied in Class.
74. Hands on Practice and Result Analysis of the Network Command for Linux OS studied in Class.
75. With the help of Google Search list 05 no's of Free and Paid Network Diagnostic Tools
76. Calculation and Comparison of the Network Speed between Windows and Linux OS on 5(PC)+1(Server) Environment.

### **CHM4-R3 Working and Maintenance of Computer System**

77. Download datasheet of all logic gates ICs
78. Performing AND, OR, NOT, XOR, EX-OR, EX-NOR, NAND and NOR Logical operations using Logic Gates ICs.
79. Implementation of all Logic Gates using NAND.
80. Implementation of all Logic Gates using NOR.
81. Half Adder Implementation using Logic Gates
82. Full Adder Implementation using Logic Gates.
83. Half Subtractor Implementation using Logic Gates.
84. Full Subtractor Implementation using Logic Gates.
85. Implementation of 4:1 MUX using IC 74153 using datasheet
86. Implementation of 1:4 DEMUX using IC 74139 using datasheet.
87. Implementation of SR Latch using Logic Gates
88. Implementation of SR using Logic Gates.
89. Use of Datasheet for specification, electrical Properties and Application of Intel i7 Processor.
90. Use of Datasheet for specification, electrical Properties and Application of Intel i9 10980XE Processor.
91. Disassembly, Component Identification and Assembly of Laptop.
92. Disassembly, Component Identification and Assembly of Laptop Power Supply.
93. Disassembly, Component Identification and Assembly of Battery Charging Circuit of Laptop.
94. Formatting and Installation of Windows OS and Driver on Laptop.
95. Formatting and Installation of Ubuntu Linux OS and Driver on Laptop.
96. Installation of Dual OS (Windows and Linux Both) on Laptop.
97. Open the Laptop BIOS Setup and note down the setting and operation of following
  - CPU Configuration.
  - On Board device configuration.
  - Power Management Configuration.
  - Hardware Health Configuration.
  - Booting Process Configuration.

## NSQF QUALIFICATION FILE

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98. Practically identify failure of Hardware and Software components of Desktop PC during POST test and remove the failure.
99. Practically identify failure of Hardware and Software components of Laptop during POST test and remove the failure.
100. Install any Free Antivirus software in PC and check for virus infection and its removal.
25. Visit Market, Technical Institution and Industries for survey and comparison of Work Station, Laptop, Mid Range Computer, MainFrame Computer and Super Computer in terms of specification, electrical properties, cost and Applications.

### Pass/Fail

The marks will be translated into grades, while communicating results to the candidates. The gradation structure is as below: -

Pass Percentage	Grade
Failed (<50)	F
>=50%-54.99%	D
>=55%-64.99%	C
>=65%-74.99%	B
>=75%-84.99%	A
>=85% and over	S

**\*Assessment for the Qualification will be conducted as per the guidelines as applicable from time to time.**

## NSQF QUALIFICATION FILE

### SECTION 2

#### 25. EVIDENCE OF LEVEL

##### OPTION A

Title/ Name of qualification/ component: CHM (Computer Hardware Maintenance) 'O' Level Course			Level: 4
NSQF Domain	Outcomes of the qualification/ component	How the outcome related to the NSQF level descriptors	NSQF Level
Process	Expected to have well developed skill, with clear choice of procedures in areas related with advanced PC Hardware and Networking Components, Data Communication and Computer networks, Network Management and Administration, Linux Administration and Entrepreneurship Development	One can achieve well developed skill, with clear choice of procedures in PC, Hardware and networking.	4
Professional knowledge	Knowledge of facts, principles, processes and general concepts, acquired through studying various module topics as per the curriculum.	Gains knowledge of facts, principles, processes and general concepts, in a field of PC, Hardware and networking.	4
Professional skill	A range of cognitive and practical skills required to accomplish tasks and Solve problems related with advanced computer hardware, maintenance and networking by selecting and applying basic methods, tools, materials and information covered as per the various practical modules of the curriculum.	Practical skills required for accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information in PC, Hardware and networking is achieved.	4
Core Skill	Desired mathematical skill needed for applying the knowledge and skill learned; understanding of social, political; and some skill of collecting and organising information, communication in the areas covered under the curriculum.	Desired skill, understanding of PC, Hardware and networking, collecting and organising information, communication is achieved.	4

## NSQF QUALIFICATION FILE

Responsibility	Responsibility for own work and learning and some responsibility for others" works and learning.	Ability of responsibility for own work and learning and some responsibility for others' works and learning shall be improved.	4
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## NSQF QUALIFICATION FILE

### SECTION 3

#### EVIDENCE OF NEED

26	<p><b>What evidence is there that the qualification is needed? What is the estimated uptake of this qualification and what is the basis of this estimate?</b></p> <p>MAIT - Ernst &amp; Young Study 2003 about the need for computer hardware professionals Report of NIELIT Scheme on Hardware Courses As per the report prepared by KPMG Advisory services pvt. ltd., for NSDC on human resource and skill requirements in the electronics and IT Hardware sector (2013-17, 2017, 22), Electronics &amp; It Hardware is one of the emerging sectors for employment growth in India. Industry currently employs over 4.3 million people across manufacturing, Sales and marketing (including Retail) and Repair &amp; Maintenance segments. Policy initiatives on promoting manufacturing along with increasing disposable income would drive the growth for the sector. Industry is expected to witness an addition of 4.61 million during 2013-22. Repair and Maintenance segment would contribute to maximum growth of employment. Presently this course is included in the courses under the project “Skill Development in ESDM Sector” under MeiTY, MCIT, Govt. of India.</p>
27	<p><b>Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences.</b></p> <p>This is the only course, covering the syllabus mentioned, offered as part of the Hardware Scheme by NIELIT, an autonomous society under Ministry of Electronics and IT, Govt. of India.</p>
28	<p><b>What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF? Give justification for presenting a duplicate qualification</b></p> <p><b>This is the only course, covering the syllabus mentioned, offered as part of the Hardware Scheme by NIELIT, an autonomous Scientific society under Ministry of Electronics and IT, Govt. of India.</b></p>
29	<p><b>What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated? Specify the review process here</b></p> <p>The syllabus was revised to include the recent technology. Data used: Industry reports, study reports / projections/ outlook in the sector</p>

## NSQF QUALIFICATION FILE

	<p>In future, it is planned to revise the question bank, accreditation guidelines etc in every 3 years including The following data will be used</p> <ol style="list-style-type: none"><li>1. Results of assessments</li><li>2. Employer feedback will be sought post-placement</li><li>3. Student feedbacks</li><li>4. Workshops and seminar for reviewing the qualifications</li><li>5. Industry Requirements</li><li>6. Consultation/ Tie-up with Industries or Expert for review of the Curriculum.</li></ol> <p>The NIELIT SCHEME HARDWARE COURSES consisting of 1) CHM O and 2) CHM A level courses were started during 2006-07 in association with Manufacturer's Association for Information Technology (MAIT), an apex body representing IT hardware manufacturing, training, design, R&amp;D and associated services in India.</p> <p>The objective of the scheme is to generate quality manpower for computer hardware maintenance and networking by utilizing the facilities and expertise available with training institutes/ organizations in the non-formal sector. Under this scheme, Diploma in Computer Hardware Maintenance (CHM) – 'O' Level and Advance Diploma in Computer Hardware Maintenance &amp; Networking (CHM) – 'A' Level courses are offered. Nodal Centre for the Scheme is NIELIT Centre, Aurangabad.</p>
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### **SECTION 4**

#### **EVIDENCE OF PROGRESSION**

<b>30</b>	<p><b>What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?</b> <b><i>Show the career map here to reflect the clear progression</i></b></p> <p>With the CHM qualification students can join jobs based on the opportunities and can develop experience and move further in their career. Trainee Engineer -&gt; Service Engineer -&gt; Technical Support Engineer Network Engineer Network Administrator -&gt; Network Analyst -&gt; Chief Information Officer</p>
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