



QUALIFICATION FILE

Senior technician-Computer Engineering and IT Infrastructure

- ☐ Short Term Training (STT) ☒ Long Term Training (LTT) ☐ Apprenticeship
☐ Upskilling ☐ Dual/Flexi Qualification ☐ For ToT ☐ For ToA
☒ General ☐ Multi-skill (MS) ☐ Cross Sectoral (CS) ☐ Future Skills ☐ OEM

NCrF/NSQF Level: 4.5

Submitted By:

NETTUR TECHNICAL TRAINING FOUNDATION

23/24, II PHASE, PEENYA INDUSTRIAL AREA,
BENGALURU – 560058, KARNATAKA

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Section 1: Basic Details

1.	Qualification Name	Senior technician- Computer Engineering and IT Infrastructure	
2.	Sector/s	IT- ITeS	
3.	Type of Qualification: ☒ New ☐ Revised ☐ Has Electives/Options ☐ OEM	NQR Code & version of existing /previous qualification: <i>(change to previous, once approved)</i>	Qualification Name of existing/previous version: Senior Technician Computer Engineering and IT Infrastructure
4.	a. OEM Name b. Qualification Name <i>(Wherever applicable)</i>	NA	
5.	National Qualification Register (NQR) Code & Version <i>(Will be issued after NSQC approval)</i>	QG-4.5-IT-01985-2024-V1-NTTF	6. NCrf/NSQF Level: 4.5
7.	Award (Certificate/Diploma/Advance Diploma/ Any Other) <i>(Wherever applicable specify multiple entry/exits also & provide details in annexure)</i>	Certificate	
8.	Brief Description of the Qualification	Computer Engineering and IT Infrastructure Integrates Hardware and Software. Candidates with Computer Engineering skills are highly required for the demanding technologies Cloud computing, Cyber security, Computer Networks and Development of various applications. The subjects covered in this Programme are – Cloud Computing, Cyber Security, Software Testing, ITIL, DevOps (Testing) Organizational Behaviour and Project Management, Artificial Intelligence and Machine Learning, Employability Skills, AWS Cloud Lab, Cyber Security Lab, Software Testing Lab, DevOps Lab, DBA Lab, Artificial Intelligence and Machine Learning Lab, Project / OJT	

9.	Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	a. Entry Qualification & Relevant Experience: <table border="1" data-bbox="953 256 1995 418"> <tr> <th data-bbox="953 256 1037 354">Sl. No.</th> <th data-bbox="1037 256 1759 354">Academic/Skill Qualification (With Specialization - if applicable)</th> <th data-bbox="1759 256 1995 354">Required Experience (with Specialization)</th> </tr> <tr> <td data-bbox="953 354 1037 418">1</td> <td data-bbox="1037 354 1759 418">Advance Certificate – Technician IT Support Level-4.0 from NTTF</td> <td data-bbox="1759 354 1995 418">NA</td> </tr> </table>						Sl. No.	Academic/Skill Qualification (With Specialization - if applicable)	Required Experience (with Specialization)	1	Advance Certificate – Technician IT Support Level-4.0 from NTTF	NA												
Sl. No.	Academic/Skill Qualification (With Specialization - if applicable)	Required Experience (with Specialization)																							
1	Advance Certificate – Technician IT Support Level-4.0 from NTTF	NA																							
10.	Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))	Total Credit – 40			11. Common Cost Norm Category (I/II/III) (Wherever applicable): NA																				
12.	Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)	NA																							
13.	Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)	☐ Offline ☐ Online ☒ Blended <table border="1" data-bbox="932 626 2011 873"> <thead> <tr> <th data-bbox="932 626 1201 756">Training Delivery Modes</th> <th data-bbox="1201 626 1352 756">Theory (Hours)</th> <th data-bbox="1352 626 1503 756">Practical (Hours)</th> <th data-bbox="1503 626 1667 756">OJT / Project Mandatory (Hours)</th> <th data-bbox="1667 626 1881 756">OJT Recommended (Hours)</th> <th data-bbox="1881 626 2011 756">Total (Hours)</th> </tr> </thead> <tbody> <tr> <td data-bbox="932 756 1201 821">Classroom (offline)</td> <td data-bbox="1201 756 1352 821">280</td> <td data-bbox="1352 756 1503 821">400</td> <td data-bbox="1503 756 1667 821">400</td> <td data-bbox="1667 756 1881 821">-</td> <td data-bbox="1881 756 2011 821">1080</td> </tr> <tr> <td data-bbox="932 821 1201 873">Online</td> <td data-bbox="1201 821 1352 873">120</td> <td data-bbox="1352 821 1503 873">-</td> <td data-bbox="1503 821 1667 873">-</td> <td data-bbox="1667 821 1881 873">-</td> <td data-bbox="1881 821 2011 873">120</td> </tr> </tbody> </table> (Refer Blended Learning Annexure for details)						Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT / Project Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)	Classroom (offline)	280	400	400	-	1080	Online	120	-	-	-	120
Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT / Project Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)																				
Classroom (offline)	280	400	400	-	1080																				
Online	120	-	-	-	120																				
14.	Aligned to NCO/ISCO Code/s (if no code is available mention the same)	NCO Code – 2015/3512.9900, 2015/3513.9900, 2015/2513.0101, 2015/.2519.0100																							
15.	Progression path after attaining the qualification (Please show Professional and Academic progression)	Professional Progression: After Completion of 3 years of Full Time Programme and after 3 years of Industry Experience the Job Holder can work as Software Engineer, Desktop Support Engineer, Test Engineer, Embedded System Engineer, Cloud/Network Engineer, Server Administrator (Windows/Linux), Database Administrator, Cloud Support Associate, DevOps Engineer, Network/Cloud architect, Multi cloud Architect, Cyber Security Engineer, Data Centre Engineer, Server Architect and Database Architect. Academic Progression: Post Diploma, B. VoC and B. Tech Degree Course in Relevant areas.																							

16.	Other Indian languages in which the Qualification & Model Curriculum are being submitted	Hindi	
17.	Is similar Qualification(s) available on NQR-if yes, justification for this qualification	☐ Yes ☒ No URLs of similar Qualifications: NA	
18.	Is the Job Role Amenable to Persons with Disability	☐ Yes ☒ No If “Yes”, specify applicable type of Disability:	
19.	How Participation of Women will be Encouraged	Yes - Admission open to women candidates (30% seats are reserved for Women Candidates)	
20.	Are Greening/ Environment Sustainability Aspects Covered <i>(Specify the NOS/Module which covers it)</i>	☐ Yes ☒ No	
21.	Is Qualification Suitable to be Offered in Schools/Colleges	Schools ☒ Yes ☒ No Colleges - ☐ Yes ☒ No	
22.	Name and Contact Details of Submitting / Awarding Body SPOC <i>(In case of CS or MS, provide details of both Lead AB & Supporting ABs)</i>	Name: Mr. R Rajagopalan Position in the Organization: Joint Managing Director Email: rg@nttf.co.in Tel number: 080 – 28390215 Contact No.: 9844013448 Website: nttftrg.com	
23.	Final Approval Date by NSQC: 31 Jan 2024	24. Validity Duration: 3 years	25. Next Review Date: 01 Feb 2027

Section 2: Module Summary

NOS/s of Qualifications (In exceptional cases these could be described as components)

Mandatory Module / NOS/s: Specify the training duration and assessment criteria at NOS/ Module level. For further details refer curriculum document.

Th.-Theory **Pr.**-Practical **OJT**-On the Job **Man.**-Mandatory Training **Rec.**-Recommended **Proj.**-Project

Sl. No.	NOS/Module Name	NOS/ Module Code & Version	Core/ Non-Core	NCrF/ NSQ F Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
Semester – 5																
01	Cloud Computing	CP08515T,V1.0	Core	4.5	20	80	-	-	-	80	100	-	-	-	100	
02	Cyber Security	CP08516T,V1.0	Core	4.5		60	-	-	-	60	100	-	-	-	100	
03	Software Testing	CP08517T,V1.0	Core	4.5		40	-	-	-	40	100	-	-	-	100	
04	Organizational Behaviour and Project Management	CP08518T,V1.0	Core	4.5		40	-	-	-	40	100	-	-	-	100	
05	ITIL, DevOps (Testing)	CP08519T,V1.0	Core	4.5		40	-	-	-	40	100	-	-	-	100	
06	AWS Cloud Lab	CP08520P,V1.0	Core	4.5		-	80	-	-	80	-	80	-	20	100	
07	Cyber Security Lab	CP08521P,V1.0	Core	4.5		-	60	-	-	60	-	80	-	20	100	
08	Software Testing Lab	CP08522P,V1.0	Core	4.5		-	60	-	-	60	-	80	-	20	100	
09	DevOps Lab	CP08523P,V1.0	Core	4.5		-	60	-	-	60	-	80	-	20	100	
10	DBA Lab	CP08524P,V1.0	Core	4.5		-	60	-	-	60	-	80	-	20	100	
11	Employability Skill	CP08525T,V1.0	Core	4.5		20	-	-	-	20	75	-	-	25	100	
Duration (in Hours)/ Total Marks					20	280	320			600	575	400		125	1100	
Semester – 6																
12	Project	CP08601P,V1.0	Core	4.5		-	-	100	-	100	-	80	-	20	100	

13	OJT	CP08605P,V1.0	Core	4.5	20	-	-	300	-	300	-	75	-	25	100	
14	Artificial Intelligence and Machine Learning	CP08602T,V1.0	Core	4.5		80	-	-	-	80	100	-	-	-	100	
15	Artificial Intelligence and Machine Learning Lab	CP08603P,V1.0	Core	4.5		-	80	-	-	80	-	80	-	20	100	
16	Employability Skill	CP08604T,V1.0	Core	4.5		40	-	-	-	40	75	-	-	25	100	
Duration (in Hours)/ Total Marks					20	120	80	400	-	600	175	235	-	90	500	
Total					40	400	400	400	-	1200	750	635	-	195	1600	

Elective Modules/ NOS/s: NA

Sl. No.	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/ NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
1.																
2.																
Duration (in Hours) / Total Marks																

Optional Modules/ NOS/s: NA

Sl. No.	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/ NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
1.																
2.																
Duration (in Hours) / Total Marks																

Assessment - Minimum Qualifying Percentage

Please specify **any one** of the following:

Minimum Pass Percentage:

(Every Trainee should score specified minimum aggregate passing percentage at qualification level to successfully clear the assessment.)

To pass the Qualification, the trainee should score Minimum 40% in each Theory module, 50% in each Practical module and 60% in Project work / Internship and viva-voce.

Section 3: Training Related

1.	Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	Diploma in relevant field with 3 years as trainer or industry experience B. Tech or BE with 2 years of trainer or industry experience
2.	Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	Diploma in relevant field with 5 years as trainer or industry experience B. Tech or BE with 5 years of trainer + industry experience
3.	Tools and Equipment Required for Training	☒ Yes ☐ No (If "Yes", details to be provided in Annexure)
4.	In Case of Revised Qualification, Details of Any Upskilling Required for Trainer	NA

Section 4: Assessment Related

1.	Assessor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	Diploma with 4 years as trainer or industry experience B. Tech or BE with 3 years as trainer or industry experience
2.	Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	Diploma or B. Tech or BE with 2 years of experience
3.	Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	Diploma with 4 years as trainer or industry experience B. Tech or BE with 3 years as trainer or industry experience
4.	Assessment Mode (Specify the assessment mode)	Blended theory (online and offline in the centre) and practical
5.	Tools and Equipment Required for Assessment	Same as for training ☒ Yes ☐ No (details to be provided in Annexure-if it is different for Assessment)

Section 5: Evidence of the need for the Qualification

Provide Annexure/Supporting documents name.

1.	Research Reports: The following reports establish the Skilled Resource requirement for Computer Hardware and IT areas. 1. MSDE/ NSDC Report on Human Resources and Skill Requirements in the IT and ITes Sector (2013- 2017, 2017 – 2022) 2. Annual Report 2021-22 of Ministry of Electronics and Information Technology The above Reports predict Higher growth in IT Sector which call for large number of Hardware and Networking Technicians.
2.	Latest Market Research Reports or any other source (not older than 2 years) (Yes/No): Report by India Brand EQUITY Foundation on Indian IT and BPM Industry-2022 The Report Forecast a higher growth in demand for Skilled Man power with Computer and IT skills.
3.	Government /Industry initiatives/ requirement (Yes/No): YES – Study on Job Role of the Future by Indian Institute of Skills. National policy for skill Development and Entrepreneurship 2015 by MSDE has predicted skilled manpower requirement across key sectors by 2022 and has framed many initiatives.
4.	Number of Industry validation provided: 38
5.	Estimated nos. of persons to be trained and employed: 500/ year
6.	Evidence of Concurrence/Consultation with Line Ministry/State Departments: (Letter to be sent to the concerned ministry and copy attached) If “No”, why: Under Process

Section 6: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name.

1.	Annexure 1: NCrf/NSQF level justification based on NCrf level/NSQF descriptors (Mandatory)	Yes
2.	Annexure 2: List of tools and equipment relevant for qualification (Mandatory, except in case of online course)	Yes
3.	Annexure 3: Industry Validations Summary	Yes
4.	Annexure 4: Training & Employment Details	Yes
5.	Annexure 5: Blended Learning (Mandatory, in case selected Mode of delivery is “Blended Learning”)	Yes
6.	Annexure 6: Detailed Assessment Criteria (Mandatory)	Yes
7.	Annexure 7: Assessment Strategy (Mandatory)	Yes
8.	Annexure 13: Multiple Entry-Exit Details (Mandatory, in case qualification has multiple Entry-Exit)	No
9.	Annexure: Acronym and Glossary (Optional)	Yes
10.	Supporting Document: Model Curriculum (Mandatory – Public view)	Digital content available to trainees through Edusquares ERP (Will be made public after the qualification is approved) (Annexure 8)
11.	Supporting Document: Career Progression (Mandatory - Public view)	Yes (Annexure 9)
12.	Supporting Document: Occupational Map (Mandatory)	Yes (Annexure 11)
13.	Supporting Document: Assessment SOP (Mandatory)	Yes (Annexure 10)
14.	Supporting Document: Key Learning Outcome	Yes (Annexure 12)
15.	Any other document you wish to submit:	No

Annexure 1: Evidence of Level**Diploma – Computer Engineering and IT Infrastructure**

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/NSQF Level
Professional Theoretical Knowledge/Process	Knowledge in Computer Hardware/Software, Embedded system and PC Maintenance Skills. Capable of Identifying and troubleshooting the IT infrastructure. Identifying and providing solutions for web infrastructure and management. Identifying the security compliance required by the organization and provide optimum solution to it. Capable to manage, organize and work independently in the organization	Job Holder can design, develop and deploy software/Embedded systems based on the requirements by choosing appropriate tools and technology. Job Holder can apply his/her skills and knowledge in the field of IT Infrastructure solutions. Job Holder can work on various IT cloud solutions, Web Structures and Cyber Security. Job Holder can apply the policies, practices and ethics in the work environment.	4.5
Professional and Technical Skills/ Expertise/ Professional Knowledge	Proficiency in programming skills in the area of software development. Knowledge in Computer Hardware/ Software, Embedded system and PC Maintenance Skills. Capable of Identifying and troubleshooting the IT infrastructure. Identifying and providing solutions for web infrastructure and management. Identifying the security compliance required by the organization and provide optimum solution to it. Capable to manage, organize and work independently in the organization	Write algorithms for development, programming specific to the domain and applications. Use database, database concepts and its applications in the real IT environment. Design, develop and implement software for embedded devices. Use IoT leads to design, develop and implement system of interrelated computing devices, mechanical and digital machines. Can Implement cloud-based applications to meet the business requirements.	4.5

	Proficiency in working and managing database applications. Apply automation process in the real-world work environment. Apply advanced technologies like Cloud Computing. Develop and deploy code in an integrated and automated manner. Administrate real-world server computers. Apply security practices in Network and Cyber world.	Create and configure security for the network components. Install, configure and maintain Windows server and Linux Server computers. Can control/avoid the risks, threats, viruses, attacks by implementing cyber security principles.	
Employment Readiness & Entrepreneurship Skills & Mind - set/Professional Skill	Able to communicate Effectively with Peers and Supervisors in the work area. Good Knowledge on Organization, ethical & moral values and Practice Time Management Able to Analyze solutions Critically and Logically for fine decision making. Able to work Effectively in a Team and lead a Team. Knowledge of the latest Technologies and Industrial Trends. Will have good Ingenuity and Creativity. Will have good Leadership Skills and have an entrepreneurial for small start up	Good Communication with Peers, superiors both verbal and written, Good on Presentation Skills, QC, 5S and KAIZEN. Can Analyze situations Critically and Logically. Adopt latest Technologies emerging in the Domain. Can lead a group to work Effectively. Can solve, adopt to new Situations Creatively.	4.5

Broad Learning Outcomes/Core Skill	Apply Mathematical Knowledge in his/her domain. Prepare emails for correspondence. Use Internet to get additional Technical Information Safety and standard operating Procedures and Practices in the work area. Communicate with Peers and Superiors. Critical Thinking, Creativity and Logical thinking. Data collection, analysis, decision making ability. Solve problems using QC tools and contribute for Kaizen in the work areas. Knowledge on effective 5S, TPM and TQM activities	Good Communication with Peers, superiors both verbal and written, Good on Presentation Skills, QC, 5S and KAIZEN. Can Analyze situations Critically and Logically. Adopt latest Technologies emerging in the Domain. Can lead a group to work Effectively. Can solve, adopt to new Situations Creatively.	4.5
Responsibility	Aware of Personal/Industrial goals Adapt to changes in the work area. Thorough understanding of safety Procedures and SOPs in the relevant work area Supervise, evaluate and improve the activities of team in the shop floor	Able to Carry out Design and Integration of Hardware/Software Systems Under Minimum Supervision Guide Junior Technicians in Fulfilling Tasks Assigned to them.	4.5

Annexure 2: Tools and Equipment (Lab Set-Up)**List of Tools and Equipment: Batch Size: 30
SOFTWARE REQUIREMENT**

Sl. No.	Tool / Equipment Name	Specification
1	NMAP	Open source
2	Oracle Virtual Box	Open source
3	PUTTY	Open source
4	PUTTYGEN	Open source
5	MYSQL	Open source
6	SQL Server Management Studio	Open source
7	AWS Command Line Interface	Open source
8	AWS Schema Conversion Tool	Open source
9	Any Browser	Open source

Classroom Aids

The aids required to conduct sessions in the classroom are:

1. White board
2. Projector with screen / Smart TV
3. Laptop / computer

Note:

The Tools, Equipment, Software and other lab facilities are shared between Qualifications and batches.

Annexure 3: Industry Validations Summary

Provide summary information of all the industry validations in table. This is not required for OEM qualifications.

Sl. No.	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID	LinkedIn Profile (if available)
1	Anvation Lab	Mr.Alok Pugalia		Bangalore	8297188867	alok.pugalia@anvationlabs.com	
2	Go Digit	Mrs.Deepthy		Bangalore	7219166216	deepthy.m@godigit.com	
3	Delopt	Mrs.Seema		Bangalore	9845094553	hr@delopt.co.in	
4	Lucid Imaging	Mrs.Vidhya		Bangalore	7619211007	vidhya@lucidimaging.in	
5	Applied Materials	Mr.John		Bangalore	8066283840. 7338636327	John_Kumar@contractor.amat.com, Vidya Bheemaia h@amat.com	
6	ThoughtWorks	Mr.Ganesh		Bangalore	8754491374	stepchennai@thoughtworks.co m	
7	Samsung	Mr.Sumit		Bangalore	8826363651	sumit.premi@samsung.com	
8	By Tech India	Mr.Murali		Bangalore	7760965733	hadmin.blr@bytechin dia.com	
9	Unibiz	Mrs.Prachi		Bangalore	080-40431501	Prachih@in.unibiz.com	
10	Aliment Software Technologies	Mrs.Jayanthi		Bangalore	9900179294	jayanthi@alimentglobal.com	
11	Everest IMS	Mrs.Soumya		Bangalore	9663375546	hr@everest-ims.com	
12	Quali Test	Mr.Mathew		Bangalore	9620774897	mathai.mathew@qualitestgroup.com	
13	Happiest Mind	Mr.Balaji		Bangalore	8061960731	Not available	
14	UncannyVision	Mr.Kiran		Bangalore	9743607299	kiran.sonar@uncannyvision.com	
15	Toshiba	Mr.Sermaichamy		Bangalore	8884575263	seemai@wimerasys.com	
16	Smart Ice	Mr.Ravikumar		Bangalore	8867106900	Not available	
17	Diya Systems	Mr.Srinivas bhat		Bangalore	7022627311	shrivas.b@glowtouch.com	
18	Hgs	Mr.Thomotharan		Bangalore	9743501143	Not available	
19	Tata Elxsi Ltd	Ms.Chaitra.M		Bangalore	8022979687	chaithram @tataelxsi.co.in	
20	Pari Automation	Mr.Dheraj		Bangalore	8380097138	dhirajc@p arirobotics.com	

21	NI	Mr.Harsha Thammaiah		Bangalore	9591997400	niranjan.bv@ni.com	
22	L&T	Mr.SamirMahato		Bangalore	9740800907	Samir.Mahato@LntTechservices.com	
23	Shiksha Infotech	Mrs.Jyothi		Bangalore	9976048657	jyoti.katare@shikshainfotech.com	
24	By Tech India	Mr.Murali		Bangalore	7760965733	hadmin.blr@bytechindia.com	
25	CovalenceSystems	Mr. Ravi V		Bangalore	NIL	ravi.veeraswamy@covalensedigital.com	
26	Nxt-Gen	Mr.Suveen		Bangalore	9886302009	suveen@nxtgen.com	
27	Frontier	Mrs.Renee		Bangalore	9844244299	renee@frontier.in	
28	Tarems Technology	Mr.Prashanth Murunnikara/ Mr. Subhbrata Maity		Bangalore	9886488014/ 9740793456	prasanth.murunnikara@tarams.com	
29	Computer Sciences Corporation India Pvt Ltd	Mr.ArhamHusain		Bangalore	9980076150/ 8032485136	ahusain2 @csc.com	
30	Melange Systems Private Limited,	Mr.Sairam Kummara/ Mr.vijay		Bangalore		vijay@melangesystems.com/ sairam.kummara@melangesystems.com	
31	Skypro Technologies	Mr. Hussain		Bangalore	080-22979687 / 9886886884	athiya@skyprotechnologies.com/ hussain@skyprotechnologies.com	
32	Kites Software India Pvt.Ltd	Mr.Sreejith		Bangalore	9916320857/ 8892963692/ 9731969978	sreejith@kitesnet.com	
33	Terance System India Pvt.Ltd	Mr.Nandhan		Bangalore	09846700726 0484-2345686	nandan.ajeton@gmail.com	
34	Future Focus Infotech	Mr.SidharthaAhiuwalia		Bangalore	9845029428	sidhartha @focusite.com	
35	Virtual Technologies	Mr.Vishvanadhan		Bangalore	9845481482	virtualtech@vsnl.net	
36	Baryons Solutions	Ms.Shweta		Bangalore	9448352924, 080-25563591	shweta@baryonssoftsolutions.com	
37	Acropetals Technology	Mrs.Vandana		Bangalore	2536 6478 / 2554 2904	vandana.rao@acropetal.com	
38	Collabera Technologies	Mrs.Devaki S		Bangalore	8939182320, +91-449018400	devaki.selvarangam@collabera.com	

Annexure 4: Training & Employment Details**Training and Employment Projections:** Data to be provided year-wise for next 3 years

Year	Total Candidates		Women		People with Disability	
	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities
2023	400	More than 5000	200	More than 2000	-	-
2024	500	More than 5000	250	More than 2000	-	-
2025	600	More than 5000	300	More than 2000	-	-

Training, Assessment, Certification, and Placement Data for previous versions of qualifications: (Previous years)

Qualification Version	Year	Total Candidates				Women				People with Disability			
		Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed
	2017- 2020	209	180	179	179	79	74	74	74	NIL			
	2018 - 2021	153	142	141	141	41	40	40	40				
	2019 - 2022	162	159	150	150	42	42	38	38				

Applicable for revised qualifications only, data to be provided year-wise for past 3 years.

List Schemes in which the previous version of Qualification was implemented:

Three years Full Time Programme

Content availability for previous versions of qualifications:
☐ Participant Handbook
 ☐ Facilitator Guide
 ☒ Digital Content
 ☐ Qualification Handbook
 ☒ Any Other: In NTTF LMS and Edusquares ERP

Languages in which Content is available: English.

Annexure 5: Blended Learning**Blended Learning Estimated Ratio & Recommended Tools: NOT APPLICABLE****Refer NCVET “Guidelines for Blended Learning for Vocational Education, Training & Skilling” available on:**<https://ncvet.gov.in/sites/default/files/Guidelines%20for%20Blended%20Learning%20for%20Vocational%20Education.%20Training%20&%20Skilling.pdf>

Sl. No.	Select the Components of the Qualification	List Recommended Tools – for all Selected Components	Offline : Online Ratio
1	Theory/ Lectures - Imparting theoretical and conceptual knowledge	Physical classroom, LMS, Web based	80:20
2	Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners	Physical classroom, Workshops, Mock sessions, Case study, Role play, Group Discussions, LMS	85:15
3	Showing Practical Demonstrations to the learners	Workshop / Lab, Video recording, Simulators	70:30
4	Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	Workshop machines, Lab equipment, Simulators, Mini projects, Project	70:30
5	Tutorials/ Assignments/ Drill/ Practice	Class assignments, LMS assignments, Simulators	60:40
6	Proctored Monitoring/ Assessment/ Evaluation/ Examinations	Physical classroom, Labs, Workshop, Quiz tests, Project	75:25
7	On the Job Training (OJT)/ Project Work Internship/ Apprenticeship Training	Industry	100:00

Annexure 6: Detailed Assessment Criteria

Detailed assessment criteria for each NOS/Module are as follows:

NOS/Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Semester – 5					
Cloud Computing	Introduction: Cloud Computing Overview	15	-	-	-
	Cloud Computing Platform: Operating Systems and Virtualization	20	-	-	-
	Cloud Storage Platform: AWS Storage services	15	-	-	-
	Cloud Database Platform: AWS Database and Migration Services	15	-	-	-
	Cloud Networking and Security Platform: AWS Networking and Security Services	15	-	-	-
	Cloud Software Development Platform: Scripting and Programming	20	-	-	-
Total Marks		100			
Cyber Security	The Need of Cyber security- Application	15	-	-	-
	Information security Overview	15	-	-	-
	Security Threats and Vulnerabilities- Types and Application	15	-	-	-
	Cryptography/Encryption -Types and Application	20	-	-	-
	Security Management -Types and Application	15	-	-	-
	Cyber security Legal and Ethical Issues- Application	20	-	-	-
Total Marks		100			
Software Testing	Introduction and fundamentals- Applications	15	-	-	-
	Levels of Testing, Testing Technique-Types and Applications	25	-	-	-
	Types of Testing, Testing Plan-Types and Application	25	-	-	-
	Defect Life cycle, Testing Tools-Types and Application	15	-	-	-
	Introduction of Selenium-Application	20	-	-	-
	Total Marks	100			
Organizational Behaviour and Project Management	Introduction to organization behaviors- Types and Application	20	-	-	-
	Conflict, Leadership- Types and Application	20	-	-	-
	Stress Management and Group Discussion, Motivation, Personality	30	-	-	-
	Principles of Management- Types and Application	30	-	-	-
Total Marks		100			
ITIL, DevOps (Testing)	Introduction to ITIL- Types and Application	10	-	-	-
	ITIL Service Lifecycle processes and functions	20	-	-	-
	Introduction to DevOps- various stages and Application	30	-	-	-
	DevOps Tools- Types and Application	40	-	-	-
Total Marks		100			
Employability Skill	Leadership and Motivation	25	-	-	5
	Quality Management	25	-	-	10
	Critical thinking and Problem solving	25	-	-	10

	Total Marks	100			
AWS Cloud Lab	Deploy the EC2 instance and its configurations - load balancing, auto scaling.	-	15	-	5
	Experiment the process of taking snapshot and recover the instance.	-	10	-	5
	The different storage services like S3, EBS, EFS, create, store data and retrieve the same from cloud.	-	15	-	5
	Configure the different cloud databases RDS, DynamoDB, create and configure the database, access the database from EC2 instance.	-	15	-	5
	Demonstrate the networking concepts, create configure the different types of VPC deployment.	-	15	-	-
	Make use of the public IP, private IP, elastic IP configurations in AWS.	-	10	-	-
	Total Marks	100			
Cyber Security Lab	Different types of vulnerabilities for hacking a websites / Web Applications	-	15	-	5
	Perform Port scanning, OS scan and other types of scan to gather information of any Demo Network.	-	15	-	5
	Identify different types of malwares, Roles of firewall and Perform Inbound/Outbound rules.	-	20	-	5
	Examine Ethical hacking tool and do penetration testing	-	15	-	-
	Practice the best ways to protect Phishing attacks	-	15	-	5
	Total Marks	100			
Software Testing Lab	Write the manual test cases for different scenarios.	-	30	-	5
	Apply automation test tool-selenium to validate the software project	-	30	-	5
	Demonstrate Title check point Text Checkpoint, URL Checkpoint	-	20	-	10
	Total Marks	100			
DevOps Lab	Configure GitHub and Git, working on GitHub	-	15	-	-
	Software provisioning and configuration management with Chef, Ansible.	-	20	-	5
	Deploy Jenkins on Linux, downloading and installing proper version	-	15	-	5
	Deploy WordPress using Cloud Formation	-	15	-	5
	Develop and deploy an application with AWS CodeStar.	-	15	-	5
	Total Marks	100			
DBA Lab	Installation and configuration of SQL Server	-	15	-	5
	Set up the database in SQL Server	-	15	-	5
	Experiment to manage security in SQL Server	-	15	-	5
	List different backup and recovery methods	-	15	-	5
	Observe the use of automation using SQL Agent	-	20	-	-
	Total Marks	100			
Semester – 6					
Employability Skill	Labor Welfare and Legislation	15	-	-	5
	Customer Interaction / Service	15	-	-	5
	Conflict Resolution and Negotiation	15	-	-	5
	Getting ready for Entrepreneurship	15	-	-	5

	Job readiness and Exam Preparation	15	-	-	5
	Total Marks	100			
Project	Internal Practical	-	25	-	-
	Semester Practical	-	55	-	20
	Total Marks	100			
OJT	OJT - On the Job Training in the relevant sector	-	75	-	25
	Total Marks	100			
Artificial Intelligence and Machine Learning	Introduction to Artificial Intelligence	10	-	-	-
	Introduction to Machine Learning	5	-	-	-
	Python Essentials and Libraries	10	-	-	-
	Data in Machine Learning	10	-	-	-
	Machine Learning Types	10	-	-	-
	Supervised Learning Training Models	15	-	-	-
	Decision Trees	5	-	-	-
	Support Vector Machines	5	-	-	-
	Unsupervised Machine Learning	5	-	-	-
	Reinforcement Learning	5	-	-	-
	Case Studies	20	-	-	-
	Total Marks	100			
Artificial Intelligence and Machine Learning Lab	Setup, Configure and Explore Basics of Python	-	15	-	5
	Working with Libraries	-	25	-	5
	Supervised Machine Learning	-	25	-	5
	Unsupervised Machine Learning	-	15	-	5
	Total Marks	100			

Annexure 7: Assessment Strategy

1. ASSESSMENT STRATEGY

The Criteria for assessment is based on Modules, and. will be assigned marks proportional to its importance.

The assessment for the semester-based qualification is carried out by conducting Formative and Summative Assessments.

Regarding Theory – Sessional is based on Intermediate Tests, File / Assignments & Viva –voce: Semester end examination wherein for each Individual batch, A&E dept. at Corporate office, Bangalore creates unique question papers for theory part as well as practical – Theory comprises MCQ and descriptive questions drawn randomly from Question Bank.

Regarding the practical part, the experiments/ exercises are performed by the trainees during the LAB Hours and the trainees are allowed to record the learning of it which will be carried as their Record Marks & one Lab Test and semester end examination. Semester end examination is outcome-based experiments/ exercises of the course will be given to trainees to perform and based on the performance the mark will be awarded. The passing criteria is based on practical's performance, viva or oral exam, Test and final semester end examination.

Theory and practical Examinations are carried out by Examiners under the overall supervision of the Assessment & Evaluation Dept.

Evaluation of Theory & Practical examination is carried out by the Trained Assessors (NTTF faculty members) under the supervision of Shop floor Manager / senior faculty in a fair manner as per the assessment criteria set by A&E dept. of NTTF.

The Tabulation and processing of results shall be carried out under EDUSQUARE campus Software.

Assessment comprises the following components:

- Job carried out in Labs / workshops
- Record book
- ONLINE Examination
- Answer sheet of assessment
- Viva-voce
- Semester end examination
- ON-THE-JOB training
- Tech Talk / Shop Talk
- Extracurricular and Co-curricular Activities
- Projects
- Attendance and punctuality

2. ASSESSORS

Evaluation of Theory & Practical examination is carried out by the Trained Assessors (NTTF faculty members) in a fair manner as per the assessment criteria set by A&E dept. of NTTF.

Assessors / Faculties are trained from time to time to upgrade their skills on various aspects such as conduct of assessments, teaching methodology etc.

3. ELIGIBILITY TO APPEAR FOR THE EXAM

- The candidates should have an attendance of a minimum 90% in a semester.
- The candidates should have secured minimum Sessional Marks in Theory & Practical

4. PASS CRITERIA

To pass the Qualification, every trainee should score a minimum of 40% in each Theory and 50% in each Practical and 60% in OJT / Projects.

5. RESULTS AND CERTIFICATION

The assessment results are backed by evidence collected by assessors. Successful trainees are awarded the Diploma certificate by NTTF Corporate Office.

6. ON THE JOB

1. The candidate must score 60% to successfully complete the OJT.
2. Tools of Assessment that will be used for assessing whether the candidate is having desired skills and etiquette of dealing with customer needs & requirements and perform Soft Skills effectively:
 - Videos/photos of Trainees during OJT
 - Suggestions / Kaizens from trainees
 - Rewards and appreciation to trainees as applicable
3. Assessment will ensure the following:
 - Effective engagement with the customers
 - Understand the working of various tools and equipment.

7. SYSTEM OF GRADING

An alphabetical letter grade will be assigned for each subject based on the total marks scored in the sessional and end semester examination.

Equivalent Grade Points are used: A = 9.5, B = 8.5, C = 7.5, D = 6.5, E = 5.5, F = 0 (FAIL), I = Incomplete (MP/AB/SP) Supplementary cleared = E

The student will be issued Semester Grade Report calculating SGPA / CGPA as follows:

$$\text{Semester Grade Point Average (SGPA)} = \frac{\sum (\text{No. of Credits} \times \text{Grade Point})}{\sum (\text{No. of Credits for the Program})}$$

$$\text{Cumulative Grade Point Average (CGPA)} = \frac{\sum (\text{SGPA} \times \text{total Credits of each semester})}{\text{Total credits Acquired.}}$$

Awarding of class:**a) Awarding of class for semester:**

SGPA	Classification
8.5 and above	First class with distinction
7.5 to 8.4	First class
6.0 to 7.4	Second class
5.5 to 5.9	Pass class

b) Awarding of class for Programme:

First class with Distinction	Should have scored CGPA 8.5 and above and should have cleared all Semesters in the first attempt.
First class	Should have scored CGPA 7.5 to 8.4
Second class	Should have scored CGPA 6.0 to 7.4
Pass class	5.5 to 5.9

8. ASSESSMENT TOOLS

All assessment and evaluation activities are carried out under EDUSQUARE campus software which includes Formative assessment & Summative assessment.

- EDUSQUARE : NTTF ERP/CRM used for academic purpose EDUSQUARE erp.nttftg.com used as SaaS (software as a service) mode
- Digital Valuation System: Digital Valuation system is an innovative software solution which automates manual evaluation and help institutions to minimize the time, effort and human errors in the entire valuation process.
- Remote proctoring which includes AI based Auto Proctoring, Student authentication & Multi secure Exam browser as and when the need arises.

List of ICT Tools:

Desktop and laptops
Interactive White Board
CCTV Camera
Pen Drive
Video Conferencing
Biometric

Edusquare: NTTF ERP/CRM used for academic purpose Edusquare erp.nttftg.com used as SaaS (Software as a Service) mode

Networking: Includes Wireless access Points, Switches, Routers, Controllers across all NTTF

AWS Cloud: AWS Cloud computing platform to host NTTF website www.nttftg.com and used as backup storage.

Firewall: Network security device protecting our network by filtering traffic and blocking outsiders.

Microsoft (O365/M-365) – Email/office (Word, Excel, PPT, One Drive for all staff/students are provided using Microsoft O365 MDM (BYOD) policies implemented through M365 used as SaaS

Annexure 8: Model Curriculum

Semester: 5			Module Name: Cloud Computing	Module Code: CP08515T
Sl. No.	Module Details			Theory Hours 80
1	Introduction: Cloud Computing Overview			16h
2	Cloud Computing Platform: Operating Systems and Virtualization			16h
3	Cloud Storage Platform: AWS Storage services			16h
4	Cloud Database Platform: AWS Database and Migration Services			16h
5	Cloud Networking and Security Platform: AWS Networking and Security Services			8h
6	Cloud Software Development Platform: Scripting and Programming			8h
Semester: 5			Module Name: Cyber Security	Module Code: CP08516T
Sl. No.	Module Details			Theory Hours 60
1	The Need of Cyber security			10h
2	Information security Overview			8h
3	Security Threats and Vulnerabilities			10h
4	Cryptography/Encryption			10h
5	Security Management			10h
6	Cyber security Legal and Ethical Issues			12h
Semester: 5			Module Name: Software Testing	Module Code: CP08517T
Sl. No.	Module Details			Theory Hours 40
1	Introduction and fundamentals			4h
2	Levels of Testing			4h
3	Testing Technique			6h
4	Types of Testing			6h
5	Testing Plan			4h
6	Defect Life cycle			5h
7	Testing Tools			5h
8	Introduction of Selenium			6h
Semester: 5			Module Name: Organization Behaviour and Project Management	Module Code: CP08518T
Sl. No.	Module Details			Theory Hours 40
1	Introduction to organization behaviours			5h
2	Conflict			4h
3	Leadership			5h
4	Stress Management & Group Discussion			5h
5	Motivation			4h
6	Personality			6h

7	Principles of Management	11h
Semester: 5 Module Name: ITIL, DevOps (Testing) Module Code: CP08519T		
Sl. No.	Module Details	Theory Hours 40
1	Introduction to ITIL	5h
2	ITIL Service Lifecycle processes and functions	5h
3	Introduction to DevOps	10h
4	DevOps Tools	20h
Semester: 5 Module Name: AWS Cloud Lab Module Code: CP08520P		
Sl. No.	Module Details	Practical Hours 80
1	Create Your First Amazon EC2 Instance (Windows)	4h
2	Create Your First Amazon EC2 Instance (Linux)	4h
3	Create an EBS-Backed Linux AMI as public	4h
4	Getting Started with Amazon EC2 Auto Scaling	4h
5	Work with Elastic IP addresses	4h
6	Getting Started with Network Load Balancers	4h
7	Create your first Cloud Storage bucket using Amazon Simple Storage Service (Amazon S3)	4h
8	Introductions to the Elastic File System	4h
9	Hosting static website using S3 bucket	4h
10	Working with AWS Backup	4h
11	Restoring the AWS Backup	4h
12	Create an RDS instance in AWS	4h
13	Migrating a SQL server database to Amazon Aurora	4h
14	Setting up Amazon VPC with IPv4	4h
15	Creating AWS IAM account and managing	4h
16	Access s3 bucket from an amazon ec2 without access credentials	4h
17	Monitor the EC2 instance with Cloud Watch	4h
18	Managing Amazon EC2 Instances Using the AWS SDK for PHP Version 3	4h
19	Deploy a Node.js Stack Web App	4h
20	AWS Tools for PowerShell	4h
Semester: 5 Module Name: Cyber Security Lab Module Code: CP08521P		
Sl. No.	Module Details	Practical Hours 60
1	Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome)	6h
2	Study of different types of vulnerabilities for hacking a websites / Web Applications.	6h
3	Study of the features of firewall in providing network security and to set Firewall Security in windows.	6h
4	Perform Demo Port Scanning Using Nmap /Zen map Tool and perform Reconnaissance.	6h

5	Study the steps to Protect Microsoft word document of different version with different operating system and Steps to Remove passwords from Microsoft word	6h
6	Study "How to make strong passwords" and "passwords cracking techniques". Study the steps to hack a strong password.	6h
7	Hiding confidential information within image or in Audio using Steganography tools.	6h
8	Practice the best ways to protect Phishing attacks.	6h
9	Using Burp Suite Professional evaluate the security of web-based applications.	6h
10	Perform Google Hacking commands, to display specific results and to display Public CC Camera.	6h
Semester: 5 Module Name: Software Testing Lab Module Code: CP08522P		
Sl. No.	Module Details	Practical Hours 60
	Manual Testing	
1	Write the Test cases for Login Page of Gmail, Facebook.	4h
2	Write all the test cases using the appropriate testing techniques wherever applicable for the below requirement. REQUIREMENT 1: Here is a KSRTC application. This application is used to search KSRTC Buses for travelling different locations. The below screen will help the user to search KSRTC Buses based on Trip, Date, Time, Number of Passengers, Ladies, Service Class. Fields: Trip - Radio button (One Way or Round Trip) From: Text Box is alphanumeric; this field can accept 256 characters. The values that is available in the current database is "Bangalore, Chennai, Mumbai, Pune" To: Text Box, this field can accept 256 characters. Text box is alpha numeric. The values that is available in the current database is "Bangalore, Chennai, Mumbai, Pune"	4h
	REQUIREMENT 2: Here is a KSRTC application. This application is used to search KSRTC Buses for travelling different locations. The below screen will help the user to search KSRTC Buses based on Trip, Date, Time, Number of Passengers, Ladies, Service Class. 1. Onward Date: Text is view only; On clicking calendar Icon, Calendar will be displayed, and user can select the date of travel. Date is displayed in DD/MM/YYYY format. Time: Dropdown. Current values displayed in database is (9 a.m., 10a.m, 11a.m, 12p.m, 1p.m, 2p.m) Return Date: Text is view only; On clicking calendar Icon, Calendar will be displayed, and user can select the date of travel. Date is displayed in DD/MM/YYYY format.	
		6h

REQUIREMENT 3: Here is a KSRTC application. This application is used to search KSRTC Buses for travelling different locations. The below screen will help the user to search KSRTC Buses based on Trip, Date, Time, Number of Passengers, Ladies, Service Class. > Time: Dropdown. Current values displayed in database is (9 a.m., 10a.m, 11a.m, 12p.m, 1p.m, 2p.m) > Number of Passengers: Drop down. Current values in database is (1, 2, 3, 4) > All Ladies Checkbox > Service Class: Drop down. Current values in database is (Premium, Luxury, Deluxe, Express) > On submitting the form by clicking "Search available services", "Search results of all the KSRTC buses based on the criteria should be displayed in "KSRTC Search Results " page along with query provided by the user. UI screenshot		6h
Selenium		
1	Introduction to Selenium & its components.	4h
2	Write a selenium web driver script for opening a login page of demo.actitime.com	4h
3	Demonstrate Title check point Text Checkpoint	4h
4	Demonstrate URL check point	4h
5	Demonstrate element checkpoint	4h
6	Demonstrate working with single select dropdown	4h
7	Demonstrate working with multi select dropdown.	4h
8	Demonstrate selecting and deselecting option from multi select dropdown	4h
9	Demonstrate to get all the option which are there in the dropdown and print it in the console.	4h
10	Demonstrate Synchronization	4h
Semester: 5 Module Name: DevOps Lab Module Code: CP08523P		
Sl. No.	Module Details	Practical Hours 60
1	Hands on with GitHub and Git	4h
1.1	Creating new free GitHub account online.	
1.2	Creating new repository and commit the codes to newly created repository	
1.3	Importing the codebase from different Github account to your Github account	
1.4	Understanding different operations on Github	
2	Using Chef Solo on Linux for AWS	4h
2.1	Configure a Chef node in AWS using Chef Solo	
2.2	Write Chef cookbooks and recipes	

2.3	Use Chef attributes and templates to generalize your cookbooks	
2.4	Create Chef roles to define Chef node functions	
3	Build your first OpsWorks stack	
3.1	Build the infrastructure and automate code deployment for a PHP application with OpsWorks	4h
3.2	Registering the Instance (Linux) in OpsWorks	
3.3	Deploying Apps- Deploy test PHP application	
3.4	Execute other commands – Undeploy, Rollback, Start Web Server, Stop Web Server, Restart Web Server	
4	Getting Started with Jenkins on Windows (Hyper or Oracle VM box)	
4.1	Build the server on Hyper or Oracle VM box on on-premise machine	8h
4.2	Install and configure a Jenkins server	
4.3	Add plugins and create Jenkins jobs	
4.4	Run Jenkins jobs and examine outputs and results	
5	Software provisioning and configuration management with Ansible	
5.1	Introduction to Ansible hands-on	8h
5.2	YAML and Hands-on Exercises	
5.3	Build Ansible Inventory Files and modules	
5.4	Automate provisioning and web server deployment	
6	Linux Command Line Byte Session	
6.1	Understand what the Linux command line	4h
6.2	Directory Manipulations commands	
6.3	Use common commands for working with files and directories	
6.4	Installing Software in Linux CLI	
6.5	Sending E-mails	
7	Create AWS Resources with Terraform	
7.1	Install Terraform on Linux	6h
7.2	Configure Terraform providers	
7.3	Create AWS resources with Terraform	
8	Deploy Word press using Cloud Formation	
8.1	Create your first cloud infrastructure using Amazon Cloud Formation	8h
8.2	Use CloudFormation to launch an EC2 (Linux) instance	
8.3	Create the Stack and choose template for launching instance	
8.4	Perform Wordpress full installation in the instance	
9	Develop and Deploy an Application with AWS CodeStar	
9.1	Create AWS CodeStar projects	6h
9.2	Monitor project activity	
9.3	Develop and deploy code using AWS CodeStar	

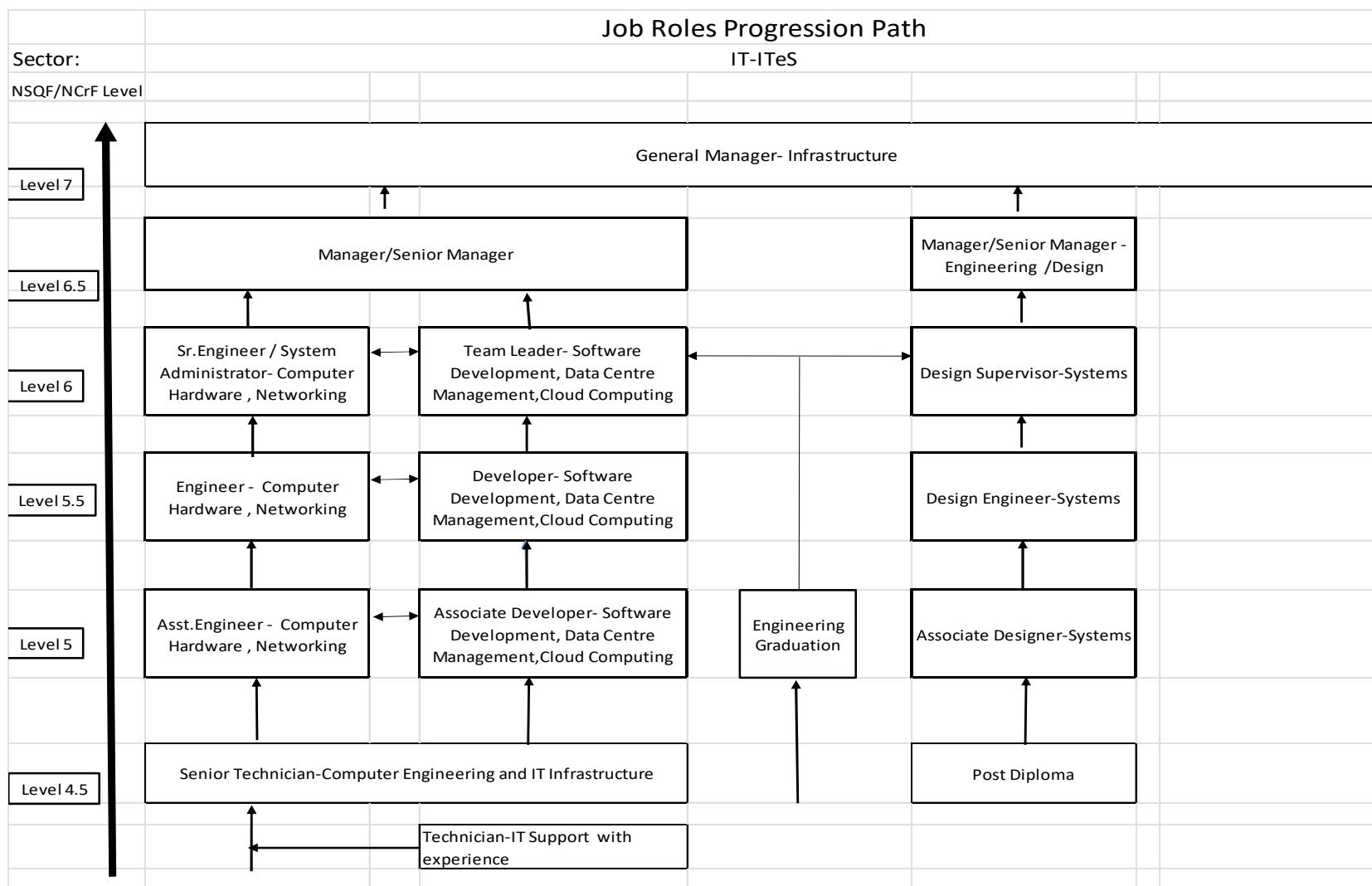
9.4	Manage teams inside of AWS CodeStar projects	
10	Use AWS Fargate for Serverless Deployment of Container Applications	
10.1	Use application source files to create Docker container images and place them in Amazon ECR	
10.2	Create an Amazon ECS cluster	
10.3	Use the Amazon ECR images to create ECS task definitions and services	
10.4	Implement the services in ECS by using AWS Fargate enjoying the advantages of serverless	
10.5	Register ECS tasks with an Application Load Balancer (ALB) target group	
Semester: 5		Module Name: DBA Lab
		Module Code: CP08524P
Sl. No.	Module Details	Practical Hours 60
1	Introduction	1h
2	Installation of SQL Server 2012	2h
	2.1 Lab Exercise: Step by Step Installation guide for SQL Server 2012	2h
3	SQL Server Management Studio (SSMS)	2h
	3.1 Lab Exercise - Exploring the SSMS	1h
	3.2 Lab Exercise - SSMS Configurations, Tips and Issues	1h
4	Architecture	2h
	4.1 SQL Server QUERY TREE Viewer (optional demo)	1h
	4.2 Lab Exercise: Viewing a QUERY PLAN	1h
5	Setting up DB	4 h
	5.1 Lab Exercises to CREATE, ALTER AND DELETE User Databases	4h
6	Security Management	12 h
	6.1 Demo: Security Components	4h
	6.2 Lab Exercise: Create Login, User, assign Permission	5h
	6.3 SQL Server Data Encryption	1.5h
	6.4 Lab Exercise: Row Level Security (RLS)	1.5h
7	Backup and Recovery	12 h
	7.1 Lab Exercise: Types of recovery models	1h
	7.2 Understanding SQL Server Backup Types	2h
	7.3 Backup Commands T-SQL Recap	3h
	7.4 Create backup using SQL Server Management Studio SSMS	3h
	7.5 SQL Server Restore Options and Commands Tutorial	3h
8	SQL Server Agent	6h
	8.1 Demo of Jobs and Schedules	5h
	8.2 Analysing Problems with SQL Server Agents	1h
9	Project 1: Security	3h
10	DB Maintenance	6h

	10.1 Lab Exercise: Maintenance Plan Wizard - Backup Schedule	3h
	10.2 Lab Exercise: Page Level Restore for a Corrupted database using DBCC	3h
11	Performance Tuning	10h
	11.1 Example of Indexing Tuning	1h
	11.2 Tools and Utilities: DMV – Dynamic Management Views	1h
	11.3 Tools and Utilities: DB Engine Tuning Advisor	2h
	11.4 Tools and Utilities: Profiler	2h
	11.5 Tools and Utilities: Performance Monitor or PerfMon	2h
	11.6 Deadlocks	2h
Semester: 5 Module Name: Employability Skills Module Code: CP08525T		
Sl. No.	Module Details	Theory Hours 20
1	Leadership and Motivation	7h
2	Quality Management	6h
3	Critical thinking and Problem solving	7h
Semester - 6 Module Name: Project Module code: CP08601P		
Sl. No.	Module Details	Practical Hours 100
1	The objective of project work is to demonstrate the candidates' skill and knowledge in solving a real work Engineering problem involving Electronics, Embedded, web designing, data base designing, data analysis and IoT System Design.	100h
Semester: 6 Module Name: OJT Module Code: CP08605P		
Sl. No.	Module Details	Hours
1	OJT- On the Job Training in the Industry	300h
Semester: 6 Module Name: Artificial Intelligence and Machine Learning Module Code: CP08602T		
Sl. No.	Module Details	Theory Hours 80
1	Introduction to Artificial Intelligence	7h
2	Introduction to Machine Learning	5h
3	Python Essentials and Libraries	7h
4	Data in Machine Learning	6h
5	Machine Learning Types	6h
6	Supervised Learning Training Models	10h
7	Decision Trees	5h
8	Support Vector Machines	5h
9	Unsupervised Machine Learning	5h

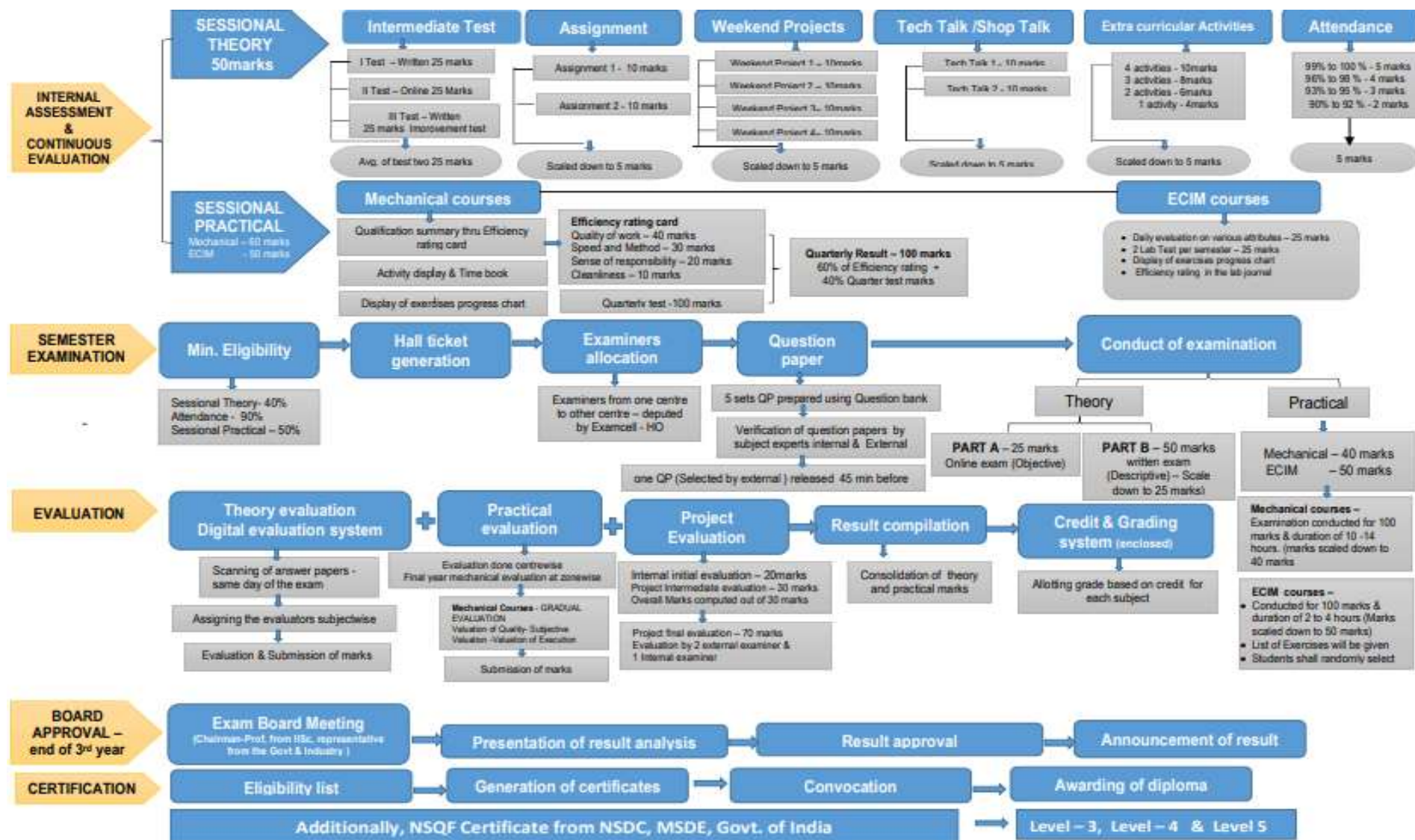
10	Reinforcement Learning	4h
11	Case Studies	20h

Semester: 6		Module Name: Artificial Intelligence and Machine Learning Lab	Module Code: CP08603P
Sl. No.	Module Details	Practical Hours 80	
1	Setup, Configure and Explore Basics of Python	16h	
2	Working with Libraries	24h	
3	Supervised Machine Learning	32h	
4	Unsupervised Machine Learning	8h	

Semester: 6		Module Name: Employability Skills	Module Code: CP08604T
Sl. No.	Module Details	Theory Hours 40	
1	Labour Welfare and Legislation	8h	
2	Customer Interaction / Service	8h	
3	Conflict resolution and negotiation	8h	
4	Getting ready for Entrepreneurship	8h	
5	Job readiness and Exam Preparation	8h	

Annexure 9: Career Progression

Annexure 10: Assessment SOP



Annexure 11: Occupational Map

As per NCrF		As per NCO-2015	Sub-Sector 1/Computers/Data centre management/ Cloud computing/Hardware and Networking	
NCrF Level (1-8)	Level Descriptors	NCO-15 -- Family (First 4 digits code/s for the given level cross cutting the OM Sub-Sectors / Occupations)	Occupation 1 /Electronics System design and Manufacturing	Occupation 2 /VLSI & Embedded System Design and Development
Level 8.0	1. Professional Theoretical Knowledge: Mastery of knowledge / Innovation driven/ Comprehensive knowledge 2. Professional and Technical Skills/ Expertise: Most advanced Technical and Managerial skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Significant authority, transformational leadership, Social intelligence 4. Broad Learning Outcomes: Lead large transformational projects 5. Responsibility: Business Vision Chairperson/ Board Member / CMD	1120	Managing Director	Managing Director
Level 7.0	1. Professional Theoretical Knowledge: Advanced knowledge with critical understanding of emerging developments 2. Professional and Technical Skills/ Expertise: Highly specialized skills, trans disciplinary skills, leadership skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Cross cultural competency, transformational leadership 4. Broad Learning Outcomes: Apply acquired advanced technical skills, technical appraisal and reviews 5. Responsibility: Business Management (like GM/ CEO / CXO, etc.)	1321 1330	GM -Infrastructure	GM Information Technology

Level 6.5	1. Professional Theoretical Knowledge: Advanced multidisciplinary and specialized knowledge 2. Professional and Technical Skills/ Expertise: Advanced Technical and Managerial Skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Leadership, effective resource management 4. Broad Learning Outcomes: Judgement in complex problems 5. Responsibility: Vertical/ Business unit management –Manager or Senior Manager	2511 2512 2519 2521 2522	Manager/Senior Manager- Computer Hardware, Networking, Software development, Data center Management, Cloud computing.	Manager/Senior Manager- Data center Management, Cloud computing.
Level 6.0	1. Professional Theoretical Knowledge: Multidisciplinary and specialized knowledge 2. Professional and Technical Skills/ Expertise: Range of skills along with specialized domain skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Entrepreneurial mindset, self-management 4. Broad Learning Outcomes: Judgement / decision making – specialized 5. Responsibility: Team leader – Junior technical supervisor, technical supervisor, or junior/ deputy manager	2511 2512 2519 2521 2522	Project Engineer - Computer Hardware, Networking, Software development, Data center Management, Cloud computing.	Project. Engineer - Data center Management, Cloud computing.
Level 5.5	1. Professional Theoretical Knowledge: Specialized knowledge 2. Professional and Technical Skills/ Expertise: Specialized skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Team readiness, self-entrepreneurship readiness	2512 2519 2522 2523 2529 3512	Sr. Engineer - Computer Hardware, Networking, Software development, Data center Management, Cloud computing. System Analyst	Sr. Engineer - Data center Management, Cloud computing. System Analyst
Level 5	4. Broad Learning Outcomes: Specialized/ complex jobs/tasks 5. Responsibility: Self and team responsibility – Sr. Technician or Master Technician	2512, 2519, 2523, 2529, 3512, 3513	Engineer - Computer Hardware, Networking, Software development, Data center Management, Cloud computing. Database Administrator	Engineer - Data center Management, Cloud computing. System Analyst

Level 4.5	1. Professional Theoretical Knowledge: Range of knowledge 2. Professional and Technical Skills/ Expertise: Range of technical skills 3. Employment Readiness & Entrepreneurship Skills & Mind-set: Team readiness & Entrepreneurial readiness 4. Broad Learning Outcomes: Carry out Range of tasks and may provide range of solutions 5. Responsibility: Accountable/ responsible - Jr. Technician & Technician	2519, 2523, 2529, 3512, 3513.	Senior Technician-Computer Engineering and IT Infrastructure, Computer-aided engineering analyst Programmer Machine Learning System Admin	Analyst AI based solutions. Senior Technical support Engineer Computer network Analyst
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Annexure 12: Key Learning Outcome

SL. NO.	MODULE NAME	KNOWLEDGE AND UNDERSTANDING	TECHNICAL & PROFESSIONAL SKILLS	APPLICATION OF KNOWLEDGE AND SKILLS
3rd Year				
01	Cloud Computing (CP08515T) AWS Cloud Lab (CP08520P) Understanding Cloud computing, configuring cloud storage and deploying software.	Discuss cloud computing fundamentals and different types of cloud and their services. Discover the web-based business processes and cloud implications. Define working principles and implement cloud instances. Identify the various types of cloud storage. Predict and configure different cloud type databases, backup and recovery. Identify the cloud virtual network setup and configure its features. Observe the cloud security features.	AWS Architecture and Services. EC2 instance and its configurations - load balancing, auto scaling. Different storage services like S3, EBS, EFS, create, store data and retrieve the same from cloud. Configure the different cloud databases RDS, DynamoDB. Create and configure the database, access the database from EC2 instance. Demonstrate the networking concepts, create configure the different types of VPC deployment. Make use of the public IP, private IP, elastic IP configurations in AWS. Cloud Solution Architecture and Security.	Instant deployment of computing servers in production servers. AWS Management and Deployment. Data Storage and Backup. Infrastructure as a Service. Deploy the various AWS Software Development Kits for different software development platforms. Write the script for deployment of software in cloud platform. Apply the security configurations and enhancement of resource using Identity and Access Management.
02	Cyber Security (CP08516T) Cyber Security Lab (CP08521P)	Knowledge on different Cyber-attacks and protection mechanism. Classical Encryption Techniques and its application.	Perform vulnerability assessments using tools and penetration testing. Protect the web browser and software updation and applying firewall rules.	Protect computer networks and user data from unauthorized access. Prevent cyber-attacks.

	Understanding Cyber-attacks, encryption techniques, firewall protection, security challenges.	Malware and roles of firewall. Ethical Hacking, penetration testing and tools. Identify the security challenges in cloud generation.	Protection against various attacks. Perform Ethical Hacking	Ensure the continuity of the business operations, after an attack. Implement ethical hacking to improve the security of organizations.
03	Software Testing (CP08517T) Software Testing Lab (CP08522P) Understanding testing technique and Product quality.	Explain the different testing types and techniques. Identify different testing tools and its deployment. Conclude the importance of tester role to produce a quality product.	Test Planning and Management. Write the manual test cases for different scenarios. Work with automation testing tool Selenium. Test Design and Execution, Test Report. Analytical and Problem-Solving Skills.	Use Selenium automation test tool for software project. Quality Assurance. Risk Mitigation, Performance Optimization. Continuous Improvement.
04	Organizational Behaviour and Project Management (CP08518T) Understanding Organizational structure, Human behaviour and Principles of Management.	Observe individual behaviour in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, decision making and motivational theories. Observe group behaviour and discussions in organizations, including communication, leadership, power and politics, conflict and negotiations. Describe the organizational system, including organizational structures, culture, human resources and change. The Principles of Management.	Knowledge and Skills, need to become expert in the filled and to make valuable contribution to organization as managers, consultant and researchers.	Understanding of individual behaviour. Group behaviour and Dynamics. Organizational structure and culture. Leadership management. Communication. Conflict management. Effectively manage and Lead organization and create a positive and productive work environment.

05	ITIL, DevOps (Testing) (CP08519T) DevOps Lab (CP08523P) Understanding various DevOps automation tools and different services used n cloud platform using AWS.	Identify the ITIL components and their functions. Explain the stages of ITIL & Analyse the various functions. Knowledge on various DevOps Tools- GitHub, Chef, Puppet, Jenkins, Ansible, Maven, Docker. Containerization.	Deploy Jenkins on Windows, downloading and installing proper version. Configure GitHub & Git, working on GitHub. Configure Jenkins Demonstrate working with Software provisioning and configuration management with Ansible, chef, terraform. Deploy WordPress using Cloud Formation. Collaboration and Communication Skills. Agile and Lean Methodologies.	Version control Systems. Continuous Integration and Continuous Delivery (CI/CD) Pipeline Management. Infrastructure as Code (IaC)-Chef, Puppet, Ansible, Terraform. Containerization and Orchestration. Aws Services-Ops works stack, Aws code star. Monitoring and Logging-Nagios, Maven.
06	DBA Lab (CP08524P) Understanding installation and configuration, manage security and different backup and recovery methods in SQL Server	Explain installation and configuration of SQL Server. Explain how to manage security in SQL Server. List different backup and recovery methods Discuss database Maintenance and query tuning.	Set up the database in SQL Server. Perform installation, configuration, backup and recovery methods. Secure SQL Server. Observe the use of automation using SQL Agent. Industry Knowledge. Problem-Solving and Analytical Skills.	Apply knowledge in Database Administration. Database Design, Database Maintenance, Disaster Recovery, Performance Tuning. Application management. Cloud-based Database Administration.

07	Project (CP08601P) / OJT (CP08605P) Develop and understand the use of software, web-based applications, IoT, Artificial intelligence/Machine Learning applications and manage cyber security	Knowledge on Software Development Life Cycle. Various Programming languages for development. Scripting languages for managing, configuring, provisioning servers. IOT, Artificial Intelligence/Machine Learning.	Develop applications and solutions including Software and Hardware. Use tools in–Artificial Intelligence /Machine Learning, Cloud Platform, Various web Frameworks. Execute task in Infrastructure maintenance, support and security.	Cloud Administration, Embedded Systems, IoT, Artificial Intelligence/Machine Learning. Software Development/Web Development. Cyber Security.
08	Employability Skills (CP08525T) Employability Skills (CP08604T) Understand Labour Welfare and Legislation. Understand the concept of Quality Management Getting ready for Employment/ Entrepreneurship Learn to interact with customers/ provide service.	Knowledge on benefits guaranteed under various Acts, legislations, Factories act, Apprenticeship Act, ESI, EPF Acts, Payment of wages act, women's compensation Act, POSH, and other industrial laws. Understanding of Quality concepts, QMS, PDCA QC Tools, 5S, Kaizen. ISO Process. Understanding the pathway and progression. Creating resume and apply for Jobs.	Explain various Acts enacted for labour welfare by various Governments. Attend mock interviews, create Resume documents. Body language, relationship building, probing techniques. Distinguishing between Job and Career, Awareness of different job roles in the related sector.	Use of various QC tools and Kaizen for problem solving and Quality improvement themes. Customer handling from greeting, grievance handling.
09	Artificial Intelligence and Machine Learning (CP08602T) Artificial Intelligence and Machine Learning Lab (CP08603P)	Explain the applications of AI and ML Knowledge on Data Processing & visualization Distinguish between various methods in Machine Learning Differentiate CNN and RNN Explain Python programming applications.	Perform data cleaning, transformation and Visualization. Implement model deployment and scaling using deep learning. Create Evaluation Metrics for Classification Models	Develop the applications or Cloud based AI services using AI and ML methodologies. Apply the Supervised learning methods in the appropriate applications. Demonstrate with case studies.

Annexure: Acronym and Glossary**Acronym**

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service or technology.
Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above. https://ncvet.gov.in/sites/default/files/NCVET.pdf