CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

Name and address of submitting body:

Punjab State Board of Technical Education and Industrial Training
Plot-l A, Sector-36 A, Chandigarh - 160036

Name and contact details of individual dealing with the submission

Name: Dr Balraj SIngh

Position in the organisation: Director Academics

Address if different from above: Punjab State Board of Technical Education and Industrial Training
Plot-l A, Sector-36 A, Chandigarh - 160036

Tel number(s): 0172-2665483

E-mail address: psbte.affiliation@gmail.com

List of documents submitted in support of the Qualifications File

Curriculum Document **(Annexure I)**

SUMMARY

Qualification Title	3 year diploma course in Computer Science and Engineering
Qualification Code	
Nature and purpose of the qualification	To provide skilled manpower required for middle level management at level V in the field of Computer Science and Engineering
Body/bodies which will award the qualification	Punjab State Board of Technical Education and Industrial Training, Plot-l A Sector-36A, Chandigarh- 160036
Body which will accredit providers to offer courses leading to the qualification	AICTE/NBA
Body/bodies which will carry out assessment of learners	Assessment of learners shall be regulated by the Punjab State Board of Technical Education & Industrial Training. Knowledge aspect of learners will be assessed by the assessors from the Institute offering the programme whereas the Skill aspect will be assessed by appointing internal and external assessors. Internal Assessors will be from the Institute offering the programme whereas External Assessors will be appointed from the Institutes/Sector Skill Councils/Industry/Assessment Centres deputed and approved by the regulatory authority.
Occupation(s) to which the qualification gives access	1. Junior Programmer 2. Junior Network Engineer 3. Data base administrator 4. Hardware Engineer/Technician 5. Maintenance Engineer/Technician 6. Cyber Security Engineer 7. Web Designers 8. Data Entry Operator 9. Software Testing Engineer 10. Computer Teacher 11. Graphic Designers 12. Lab Technician in Technical Institutions
Licensing requirements	N.A.

Level of the qualification in the NSQF	Level V
Anticipated volume of training/learning required to complete the qualification	3840 hrs + 150 hrs for industrial training
Entry requirements and/or recommendations	10+
Progression from the qualification	The learner will either take up job in the industry or go for higher studies at level VI.
Planned arrangements for the Recognition of Prior learning (RPL)	Presently, there is no such arrangement
International comparability where known	Existence of any official document suggesting the comparability of the qualification with the qualifications in other countries is not known.
Formal Structure of the Qualification	As per **Annexure II**
Date of planned review of the qualification.	Year 2020

SECTION 1
ASSESSMENT

Body/Bodies which will carry out assessment:

Assessment of learners shall be regulated by the Punjab State Board of Technical Education & Industrial Training.

Knowledge aspect of learners will be assessed by the assessors from the Institute offering the programme whereas the Skill aspect will be assessed by appointing internal and external assessors. Internal Assessors will be from the Institute offering the programme whereas External Assessors will be appointed from the Institutes/Sector Skill Councils/Industry/Assessment Centres approved by the regulatory authority.

How will RPL assessment be managed and who will carry it out?

Presently there is no such arrangements. However, it is envisaged that RPL assessment will be managed by the authority specified by the NSDA by taking into account the following parameters:-

- Professional Knowledge
- Professional Skills
- Core Skills
- Responsibility
- Process/Type of Job handled

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.

ASSESSMENT GUIDELINES:

- The assessment is carried out by conducting formative assessment and end-of-semester examinations.
- The internal assessments for theory subjects and practical are conducted by the concerned teachers/instructors for evaluating the knowledge, skill and attitudes acquired by students as per the specified learning outcomes.
- Assessment is carried out in various subject areas to ensure achievement of Learning Outcome.
- This assessment is primarily carried out by collecting evidence of competence gained by students to assess understanding and by evaluating records and reports, and sessional marks are awarded to them.
- The question papers for the theory examinations contain a combination of objective type questions, short answer type questions and descriptive type questions
- Assessment is mainly based on following criterion :
  Theory Test : Knowledge, comprehension, application, analysis and synthesis
  Practical Test : Manipulative Skils, Accuracy, finish, speed, sequence of performance, economical use of material, quality of workmanship, neatness

ELIGIBILITY TO APPEAR IN THE EXAM:

75 % attendance is compulsory for students to appear for the assessment.

ASSESSORS:

- The assessment papers are developed by Subject Experts appointed by Punjab State Board of Technical Education to ensure fair, valid and reliable assessment.
- The assessors are provided with assessors guide developed by the Subject Expert as per the assessment framework.
- To hire assessors with integrity, reliability and fairness. Each assessor signs a document by which they commit themselves to comply with the rules of confidentiality and conflict of interest, independence from commercial and other interests that would compromise impartiality of the assessment.

MARKING PATTERN:

Marking Pattern and distribution of marks for various courses/subjects are given in study and evaluation scheme of the curriculum documents.

PASSING MARKS:

Pass criteria for the qualification is that every student must score a minimum of 40 % both in Theory and Practical.

RESULTS AND CERTIFICATION:

The assessment results are backed by evidences collected by assessors. Successful students are awarded certificates of three year diploma course by State Board of Technical Education, Punjab.

ASSESSMENT EVIDENCE:

- Answer sheets of assessment
- Experiments performed in laboratories
- Jobs carried out in workshops
- Assignments
- Viva –voce
- Quiz test.
- Report Writing
- Presentation
- Record book/Practical Note book/Daily Diary
- Attendance and punctuality

ASSESSMENT EVIDENCE

In this section, you are asked to show how the assessment tools you will use will cover all the outcomes and criteria in the qualification.

Assessment evidence in tabular form describing the assessment tools to be used for assessing the learning outcomes is attached at **Annexure III**

SECTION 2
EVIDENCE OF LEVEL

Awarding bodies will enter a proposed NSQF level for the qualification in the Qualification File Summary. This section asks for the evidence on which that proposal is based. The evidence must refer to the level descriptors of the NSQF.

Evidence of the level describing the title of the subjects, corresponding NSQF level, learning outcome, relation of learning outcome with NSQF level is attached at **Annexure IV**

SECTION 3

EVIDENCE OF NEED

What evidence is there that the qualification is needed?

Samples of advertisement from the potential employers are attached at **Annexure V**

The pass out students get absorbed in different types of industries. A list of employers along with contact person details is attached at **Annexure VI.**

What is the estimated uptake of this qualification and what is the basis of this estimate?

Around 3000 Students in Computer Science and Engineering are trained every year to acquire the qualifications.
It has been found that at National Level there is an incremental gap between demand and supply of the Technical manpower at Level-V in this field. To bridge this gap and to match the needs of the industry the above estimated number of students will be trained.

This programme is being offered in various polytechnic colleges in Punjab State (Refer website punjabteched.com) approved by AICTE, Delhi (www.aicte-india.org/ApprovedInst16-17.php)

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?

Inspections of the Institute offering this programme will be carried out at regular intervals. Academics Committees will be constituted for Periodical review of the curriculum.
Placement Data and Technological advancement related to the field will be used as the basis for revision and updation of the curriculum.
Such information will be collected from respective Sector Skill Councils and the Industry. The data so collected will be used as the basis for revision/updation of the Qualification.
Continuous monitoring of the curriculum will be carried out and comprehensive review of the curriculum will be undertaken in the year 2020.

SECTION 4
EVIDENCE OF PROGRESSION

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?

While designing this qualification, extensive inputs were obtained by involving experts from Academic Institutions/Industry/Representatives of State Govt./NSDA and Faculty of National Institute of Technical Teachers' Training and Research (NITTTR), Chandigarh.

The students passing out from diploma programme in Computer Science and Engineering are eligible for admission (lateral entry) to bachelor's degree in Computer Science and Engineering. A sample copy of the Govt. Notification for admission to degree courses through lateral entry system is attached on **Annexure VII**

To ensure progression to other qualifications, the following points have been kept in mind while developing the curriculum :

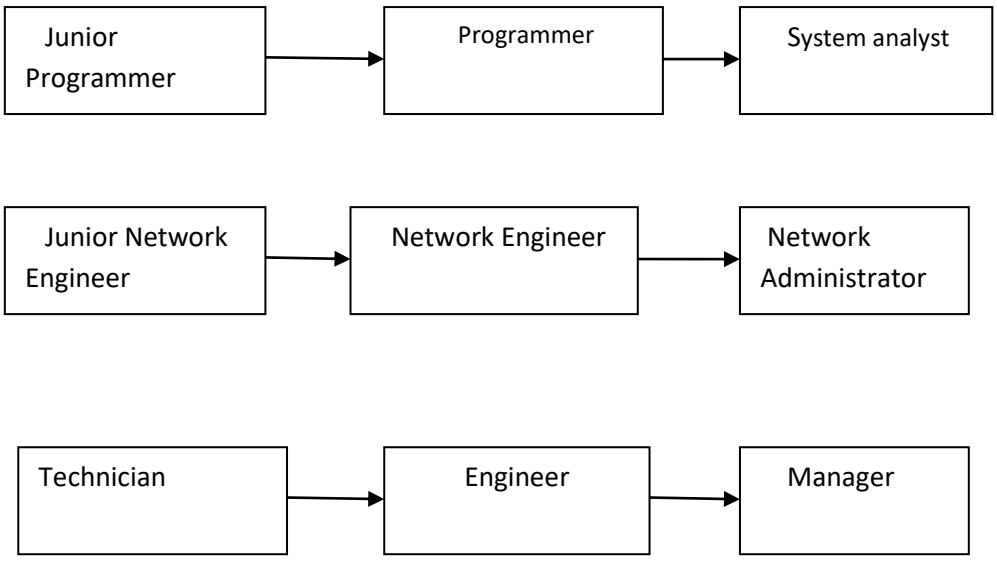
i) The learning outcomes have been spelled out keeping in mind professional knowledge, skills, life long learning, entrepreneurship development and self study.

ii) The outcomes have been spelled out at programme level and course level and provide scope for higher learning opportunities.

Progression of Diploma holder in Computer Science and Engineering :

The qualifying student will be absorbed initially by the industry as Junior Programmer, Junior Network Engineer, or technician. After 3-4 years, he will be working as programmer/network engineer/engineer. After 7-8 years, he will work as system analyst/network administrator/manager.

The different progression pathways of diploma holder in Computer Science and Engineering are given as follows.



Annexure-II

FORMAL STRUCTURE OF THE QUALIFICATIONS

Sr.	Title of Subject/Unit	Mandatory (M)/ Optional (O)	Estimated Size Learning Hours		NSQF Level		
			Theory	Practical	4	5	6
FIRST SEMESTER							
1.1	English and Communication Skills- I	M	48	32		5	
1.2	Applied Mathematics – I	M	80	-		5	
1.3	Applied Physics – I	M	64	32		5	
1.4	Applied Chemistry - I	M	64	32		5	
1.5	Engineering Drawing - I	M	-	96		5	
1.6	General Workshop Practice - I	M	-	96		5	
1.7	Computer Fundamentals and Information Technology	M	32	32		5	
Student Centred Activities		M	-	32		5	
Total			288	352			

SECOND SEMESTER							
2.1	English and Communication Skills – II	M	48	32		5	
2.2	Applied Mathematics – II	M	80	-		5	
2.3	Applied Physics – II	M	64	32		5	
2.4	Basic Electronics	M	64	32		5	
2.5	Computer Workshop	M	-	96		5	
2.6	Environmental Studies	M	48	-		5	
2.7	Desk Top Publishing (DTP) fundamentals	M	-	64		5	
Student Centred Activities		M	-	80		5	
Total			304	336			

THIRD SEMESTER							
3.1	Digital Electronics	M	64	32		5	
3.2	Computer Programming Using C	M	48	64		5	
3.3	Software Engineering	M	64	-		5	
3.4	Operating Systems	M	48	64		5	
3.5	Multimedia and Animation Technology	M	48	64			6
3.6	Internet and Web Technologies	M	48	32			6
Student Centred Activities including Energy Conservation Awareness Camp		M	-	64		5	
Total			320	320			

FOURTH SEMESTER							
4.1	Generic Skills and Entrepreneurship Development	M	48	-			6
4.2	Data structures	M	64	64		5	
4.3	Object Oriented Programming Using Java	M	64	64			6
4.4	Computer Architecture	M	64	-		5	
4.5	Database Management System	M	64	64			6
4.6	Computer Networks and Security	M	64	32		5	
-	Industrial Training (During vacations, after examinations of 4^{th} semester)	M	-	-		5	
Student Centred Activities including Entrepreneurial Awareness Camp		M	-	48		5	
Total			368	272			

FIFTH SEMESTER							
5.1	Basics of Management	M	48	-		5	
5.2	Microprocessors	M	64	48		5	
5.3	Computer Peripherals and Interfacing	M	48	48		5	
5.4	Web Development using PHP	M	32	64		5	
5.5 (a)	Mobile Technologies	O	80	-	4		
5.5 (b)	Internet of Things	O	80	-	4		
5.5 (c)	Big Data	O	80	-			6
5.6	Minor Project	M	-	144		5	
Student Centred Activities including Personality Development Camp		M	-	64		5	
Total			272	368			

SIXTH SEMESTER							
6.1	Application development using web frame work	M	32	64		5	
6.2	Analysis and Design of Algorithm	M	64	48		5	
6.3	Cloud Computing	M	32	64		5	
6.4 (a)	Digital Marketing	O	32	48		5	
6.4 (b)	Open Source Technology	O	32	48		5	
6.4 (c)	Computer Programming using Python	O	32	48		5	
6.4 (d)	Development of Android Applications	O	32	48		5	
6.5	Major Project Work	M	-	192			
Student Centred Activities including Personality Development Camp		M	-	64			
Total			160	480			

Grand Total Number of Education & Training (excluding examination) = (1712 + 2128) = 3840 Hrs

Annexure-III

ASSESSMENT EVIDENCE

Sr.	Title of Subject/Unit	Learning Outcomes to be Assessed	Assessment Criteria	Means of Assessment	NSQF Level		
					4	5	6
1.	English and Communication Skills	Communicate effectively in English with others	As per the Study and Evaluation Scheme, Suggested Marks Distribution and Evaluation Strategy in the attached Curriculum document.	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Report writing, presentation and viva-voce		5	
2.	Applied Mathematics	Apply basic principles of mathematic to solve engineering problems	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests		5	
3.	Applied Physics	Apply basic principles of physics to solve engineering problems	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work and viva-voce		5	
4.	Applied Chemistry	Apply basic principles of chemistry to solve engineering problems	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work and viva-voce		5	
5.	Engineering Drawing	Prepare and interpret drawings of engineering components	- Do -	• Free hand sketching • Design and drawing • Assignment and quiz/class tests, mid-term and end term exams./viva-voce		5	

6.	General Workshop Practice	Use cutting tools, equipment and tooling for fabrication of jobs by following safe practices at the workplace	- Do -	• Workshop job • Report writing, presentation and viva-voce		5	
7.	Computer Fundamentals and Information Technology	Work on different software for word processing, power point presentation, spreadsheets and communicate ideas electronically	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation and viva-voce		5	
8.	Basic Electronics	Use electronic instruments to measure various engineering parameters	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work and viva-voce		5	
9.	Computer Workshop	Assemble, troubleshoot and maintain a computer system and install various software	- Do -	• Workshop job • Software installation, operation and viva-voce		5	
10.	Environmental Studies	Use appropriate procedures for energy conservation and preventing environmental pollution	- Do -	• Assignments and quiz/class tests, mid-term and end-term written test		5	
11.	Desktop Publishing (DTP) fundamental	Handle various pre-press activities by designing page layouts for digital and electronic publications by combining different media elements	- Do -	• Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce		5	
12.	Digital Electronics	Design and troubleshoot analog and digital electronic circuits	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce		5	

13.	Computer Programming Using C	Write, compile and debug programmes using different programming constructs in "C Programming"	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce		5	
14.	Software Engineering	Identify the software process model for specific software application and interpret different phases of software development life cycle	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Software installation, operation, development and viva-voce		5	
15.	Operating Systems	Use various functions and components of different operation systems Operate Linux Operation System	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work exercises and viva-voce • Software installation, operation, development and viva-voce		5	
16.	Multimedia and Animation Technology	Design multimedia graphics independently and create script of multimedia animations using authoring tools in a team	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce			6
17.	Internet and Web Technologies	Design and host static webpages/portals using internet technologies	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce			6

18.	Generic Skills and Entrepreneurship Development	Plan and execute given task and project as a team member or a leader	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests			6
19.	Data structures	Analyse problems and write program solutions to problems by choosing appropriate data structures	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce		5	
20.	Object Oriented Programming Using Java	Solve common programming problems and write programs in JAVA using OOP concepts in a way understandable to other programmers	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce			6
21.	Computer Architecture	Differentiate and contrast different architectures such as RISC/CISC by interpreting different hierarchies of memories, memory organization and component organization	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Software installation, operation, development and viva-voce		5	
22.	Database Management System	Create and manage database of its security	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce			6

23.	Computer Networks and Security	Set-up, diagnose problems, troubleshoot computer networks and maintain security of the networks	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work exercises and viva-voce • Software installation, operation, development and viva-voce		5	
24.	Industrial Training (During vacation, after examinations of fourth semester)	Work in an industrial environment	- Do -	• Report writing, presentation and viva-voce		5	
25.	Basics of Management	Manage resources effectively at the workplace	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests		5	
26.	Microprocessors	Use microprocessor based system using assembly level language programming	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce		5	
27.	Computer Peripherals and Interfacing	Differentiate and troubleshoot various hardware components used for input-output, storage, power supplies and processing in the PC organization	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce		5	
28.	Web Development Using PHP	Design and develop dynamic web sites using PHP, MYSQL and AJAX	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce • Software installation, operation, development and viva-voce		5	

29.	Mobile Technologies	Use various mobile technologies and their use in different application scenarios	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Software installation, operation and viva-voce	4		
30.	Internet of Things	Analyze various protocols for IoT	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Software installation, operation, development and viva-voce	4		
31.	Big Data	Use techniques and tools to analyze big data and create statistical models	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Software installation, operation, development and viva-voce			6
32.	Minor Project	Apply knowledge and skills gained from various sources in an integral manner	- Do -	• Report Writing • Presentation • Viva-voce		5	
33.	Application development using web frame work	Create and Manage Blogs websites using Wordpress, Web Applications using Moodle	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce		5	
34.	Analysis and Design of Algorithms	Apply various data structure techniques to implement different sorting algorithms	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work, exercises and viva-voce		5	
35.	Cloud Computing	Use and implement various services on cloud such as SAAS, PAAS, IAAS	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Software installation, operation and viva-voce		5	

36.	Digital Marketing	Develop Market strategies based on price, place and promotion objectives	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Software installation, operation and viva-voce •		5	
37.	Open Source Technology	Install and use of various open source softwares	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work exercises and viva-voce • Software installation, operation, development and viva-voce		5	
38.	Computer Programming Using Python	Write and debug simple as well as complex programmes in Python	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work exercises and viva-voce • Software installation, operation, development and viva-voce		5	
39.	Development of Android Applications	Use interactive application development with android	- Do -	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work exercises and viva-voce • Software installation, operation, development and viva-voce		5	
40.	Major Project Work	Apply the acquired knowledge and skills in solving live problems in the Computer and I.T. industry	- Do -	• Model/prototype making, assembly and disassembly exercises • Operating and developing software for a project • Report writing, presentation and viva-voce		5	

Minimum passing marks for Practical is 40%
Minimum pass marks for theory is 40%

Annexure-IV

EVIDENCE OF LEVEL

Sr.	Title of Subject/Unit	Learning Outcome	Relation of Learning Outcome with NSQF Level	NSQF Level		
				4	5	6
1.	English and Communication Skills	Communicate effectively in English with others	• Desired understanding of skills of communication		5	
2.	Applied Mathematics	Apply basic principles of mathematics to solve engineering problems	• Desired cognitive and mathematical skills to solve problems		5	
3.	Applied Physics	Apply basic principles of physics to solve engineering problems	• Desired cognitive and applied skills to solve problems		5	
4.	Applied Chemistry	Apply basic principles of chemistry to solve engineering problems	• Desired cognitive and applied skills to solve problems		5	
5.	Engineering Drawing	Prepare and interpret drawings of engineering components	• A range of cognitive and practical skills required to draw, read and interpret drawings		5	
6.	General Workshop Practice	Use cutting tools, equipment and tooling for fabrication of jobs by following safe practices at the workplace	• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information		5	
7.	Computer Fundamentals and Information Technology	Work on different software for word processing, power point presentation, spreadsheets and communicate ideas electronically	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information • Collecting and organising information and communication		5	

			• Responsibility for own work and learning and some responsibility for others' works and learning			
8.	Basic Electronics	Use electronic instruments to measure various engineering parameters	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information • Responsibility for own work and learning		5	
9.	Computer Workshop	Assemble, troubleshoot and maintain a computer system and install various software	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information • Some skill of collecting and organising information • Responsibility for own work and learning		5	
10.	Environmental Studies	Use appropriate procedures for energy conservation and preventing environmental pollution	• Knowledge of facts, principles, processes and general concepts, in a field of work or study		5	
11.	Desktop Publishing (DTP) fundamentals	Handle various pre-press activities by designing page layouts for digital and electronic publications by combining different media elements	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information • Responsibility for own work and learning and some responsibility for others' works and learning		5	

12.	Digital Electronics	Design and troubleshoot analog and digital electronic circuits	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information • Responsibility for own work and learning		5	
13.	Computer Programming Using C	Write, compile and debug programmes using different programming constructs in “C Programming”	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by use of information • Responsibility for own work and learning and some responsibility for others’ works and learning		5	
14.	Software Engineering	Identify the software process model for specific software application and interpret different phases of software development life cycle	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by use of information • Responsibility for own work and learning and some responsibility for others’ works and learning		5	
15.	Operating System	Use various functions and components of different operation systems Operate Linux Operation System	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study		5	

			• Reasonably good in mathematical calculation, understanding of organising information and logical communication • Responsibility for own work and learning and full responsibility for other's works and learning			
16.	Multimedia Animation Technology	Design multimedia graphics independently and create script of multimedia animations using authoring tools in a team	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning			6
17.	Internet and Web Technologies	Design and host static webpages/portals using internet technologies	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning			6
18.	Generic Skills and Entrepreneurship Development	Plan and execute given task and project as a team member or a leader	• Responsibility for own work and learning and full responsibility for other's works and learning			6
19.	Data structures	Analyse problems and write program solutions to problems by choosing appropriate data structures	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information		5	

			• Responsibility for own work and learning and some responsibility for others' works and learning			
20.	Object Oriented Programming Using Java	Solve common programming problems and write programs in JAVA using OOP concepts in a way understandable to other programmers	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning			6
21.	Computer Architecture	Differentiate and contrast different architectures such as RISC/CISC by interpreting different hierarchies of memories, memory organization and component organization	• Knowledge of facts, principles, processes and general concepts, in a field of work or study		5	
22.	Database Management System	Create and manage database of its security	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning			6
23.	Computer Networks and Security	Set-up, diagnose problems, troubleshoot computer networks and maintain security of the networks	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information		5	

			• Desired mathematical skill; understanding and some skill of collecting and organising information, communication • Responsibility for own work and learning and some responsibility for others' works and learning			
24.	Industrial Training (During vacation, after examinations of fourth semester)	Work in an industrial environment	• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information • Responsibility for own work and learning and some responsibility for others' works and learning		5	
25.	Basics of Management	Manage resources effectively at the workplace	• Responsibility for own work and learning and some responsibility for others' works and learning		5	
26.	Microprocessors	Use microprocessor based system using assembly level language programming	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning		5	
27.	Computer Peripherals and Interfacing	Differentiate and troubleshoot various hardware components used for input-output, storage, power supplies and processing in the PC organization	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information		5	

28.	Web Development Using PHP	Design and develop dynamic web sites using PHP, MYSQL and AJAX	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study • Reasonable good in mathematical calculation, understanding and reasonably good in data collecting organising information, and logical communication • Responsibility for own work and learning and full responsibility for other's works and learning		5	
29.	Mobile Technologies	Use various mobile technologies and their use in different application scenarios	• Factual and theoretical knowledge in broad contexts within a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning	4		
30.	Internet of Things	Analyze various protocols for IoT	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning	4		
31.	Big Data	Use techniques and tools to analyze big data and create statistical models	• Factual and theoretical knowledge in broad contexts within a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning			6

32.	Minor Project	Apply knowledge and skills gained from various sources in an integral manner	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information • Desired mathematical skill; understanding and some skill of collecting and organising information, communication • Responsibility for own work and learning and some responsibility for others' works and learning		5	
33.	Application development using web frame work	Create and Manage Blogs websites using Wordpress, Web Applications using Moodle	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning		5	
34.	Analysis and Design of Algorithms	Apply various data structure techniques to implement different sorting algorithms	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information		5	
35.	Cloud Computing	Use and implement various services on cloud such as SAAS, PAAS, IAAS	• Factual knowledge of field of knowledge or study • Responsibility for own work and learning		5	
36.	Digital Marketing	Develop Market strategies based on price, place and promotion objectives	• Factual and theoretical knowledge in broad contexts within a field of work or study • A range of cognitive and practical skills required		5	

			to generate solutions to specific problems in a field of work or study • Responsibility for own work and learning and full responsibility for other's works and learning			
37.	Open Source Technology	Install and use of various open source softwares	• Assignments and quiz/class tests, mid-term and end-term written tests • Actual laboratory and practical work exercises and viva-voce • Software installation, operation, development and viva-voce		5	
38.	Computer Programming Using Python	Write and debug simple as well as complex programmes in Python	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information • Desired mathematical skill; understanding of social, political; and some skill of collecting and organising information, communication • Responsibility for own work and learning and some responsibility for others' works and learning		5	
39.	Development of Android Applications	Use interactive application development with android	• Factual knowledge of field of knowledge or study • Responsibility for own work and learning		5	
40.	Major Project Work	Apply the acquired knowledge and skills in solving live problems in the Computer and I.T. industry	• Knowledge of facts, principles, processes and general concepts, in a field of work or study • A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information		5	

			• Desired mathematical skill; understanding and some skill of collecting and organising information, communication • Responsibility for own work and learning and some responsibility for others' works and learning			