

**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-I 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-I A, Sector-36 A, Chandigarh - 160036

**Tel number(s):** 0172-2665483

**E-mail address:** [psbte.affiliation@gmail.com](mailto:psbte.affiliation@gmail.com)

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

Curriculum Document (**Annexure I**)

## SUMMARY

|   |   |
|---|---|
| <b>Qualification Title</b>  | 3 year diploma course in Electronics and Communication Engineering  |
| <b>Qualification Code</b>   | -   |
| <b>Nature and purpose of the qualification</b>  | To provide skilled manpower required for middle level management at level V in the field of Electronics and Communication Engineering   |
| <b>Body/bodies which will award the qualification</b>                                   | Punjab State Board of Technical Education and Industrial Training, Plot-I A Sector-36A, Chandigarh- 160036  |
| <b>Body which will accredit providers to offer courses leading to the qualification</b> | AICTE/NBA   |
| <b>Body/bodies which will carry out assessment of learners</b>                          | <p>Assessment of learners shall be regulated by the Punjab State Board of Technical Education &amp; Industrial Training.</p> <p>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.</p> |
| <b>Occupation(s) to which the qualification gives access</b>                            | <ol style="list-style-type: none"> <li>1. Junior Engineer</li> <li>2. Technician in Cellular Companies</li> <li>3. Maintenance Engineer in Industry</li> <li>4. Optical Engineer</li> </ol>   |
| <b>Licensing requirements</b>   | N.A.  |
| <b>Level of the qualification in the NSQF</b>   | Level V   |

**NSQF QUALIFICATION FILE FOR DIPLOMA COURSE IN ELECTRONICS AND COMMUNICATION ENGINEERING**

|   |   |
|---|---|
| <b>Anticipated volume of training/learning required to complete the qualification</b> | 3840 hrs + 150 hrs for industrial training  |
| <b>Entry requirements and/or recommendations</b>                                      | 10+   |
| <b>Progression from the qualification</b>   | The learner will either take up job in the industry or go for higher studies at level VI.   |
| <b>Planned arrangements for the Recognition of Prior learning (RPL)</b>               | Presently, there is no such arrangement   |
| <b>International comparability where known</b>  | Existence of any official document suggesting the comparability of the qualification with the qualifications in other countries is not known. |
| <b>Formal Structure of the Qualification</b>  | As per <b>Annexure II</b>   |
| <b>Date of planned review of the qualification.</b>                                   | 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 Skills, 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 10000 students in Electronics and Communication 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](http://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 Electronics and Communication Engineering are eligible for admission (lateral entry) to bachelor's degree in Electronics and Communication Engineering. A sample copy of the Govt. Notification for admission to degree courses through lateral entry system is attached on **Annexure VII**

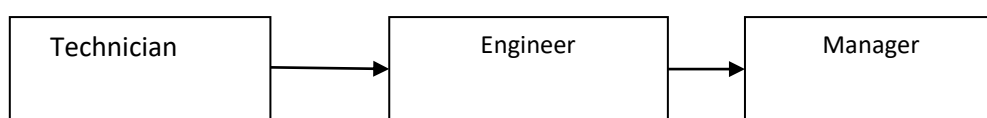
To ensure progression to other qualifications, the following points have been kept in mind while developing the curriculum :

- 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 Electronics and Communication Engineering:**

The qualifying student will be absorbed initially as technician or junior engineer in Govt./Private Sector. After 5 years, he will be working as Engineer. After 10 years, he will work as Manager

The progression pathway of diploma holder in Electronics and Communication Engineering is given as follows.



### FORMAL STRUCTURE OF THE QUALIFICATIONS

| Sr.                               | Title of Subject/Unit                   | Mandatory (M)/<br>Optional (O) | Estimated Size<br>Learning Hours |           | NSQF Level |   |   |
|-----------------------------------|---|--------------------------------|----------------------------------|-----------|------------|---|---|
|                                   |   |                                | Theory                           | Practical | 4          | 5 | 6 |
| <b>FIRST SEMESTER</b>             |   |                                |                                  |           |            |   |   |
| 1.1                               | English and Communication<br>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                               | Basics of Information Technology        | M                              | -                                | 48        |            | 5 |   |
| 1.6                               | Engineering Drawing – I                 | M                              | -                                | 96        |            | 5 |   |
| 1.7                               | General Workshop Practice – I           | M                              | -                                | 96        |            |   |   |
| <b>Student Centred Activities</b> |   | M                              | -                                | 48        |            | 5 |   |
| <b>Total</b>                      |   |                                | 256                              | 384       |            |   |   |

| <b>SECOND SEMESTER</b>            |                                     |   |     |     |  |   |  |
|-----------------------------------|-------------------------------------|---|-----|-----|--|---|--|
| 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                               | Basic Electrical Engineering        | M | 64  | 32  |  | 5 |  |
| 2.6                               | Environmental Studies               | M | 48  | -   |  | 5 |  |
| 2.7                               | General Workshop Practice-II        | M | -   | 96  |  | 5 |  |
| <b>Student Centred Activities</b> |                                     | M | -   | 48  |  | 5 |  |
| <b>Total</b>                      |                                     |   | 368 | 272 |  |   |  |

| <b>THIRD SEMESTER</b>  |   |   |     |     |  |   |  |
|--|---|---|-----|-----|--|---|--|
| 3.1  | Electronic Instruments and Measurement  | M | 64  | 32  |  | 5 |  |
| 3.2  | Principles of Communication Engineering | M | 64  | 32  |  | 5 |  |
| 3.3  | Digital Electronics                     | M | 64  | 32  |  | 5 |  |
| 3.4  | Electronic Devices and Circuits         | M | 64  | 32  |  | 5 |  |
| 3.5  | Electrical Machines                     | M | 64  | 32  |  | 5 |  |
| 3.6  | Computer Programming using C            | M | 48  | 64  |  | 5 |  |
| <b>Student Centred Activities including Energy Conservation Awareness Camp</b> |   | M | -   | 48  |  | 5 |  |
| <b>Total</b>   |   |   | 368 | 272 |  |   |  |

| <b>FOURTH SEMESTER</b>   |   |   |     |     |  |   |   |
|--|---|---|-----|-----|--|---|---|
| 4.1  | Network Filters and Transmission Lines          | M | 48  | 48  |  | 5 |   |
| 4.2  | Communication System                            | M | 64  | 48  |  | 5 |   |
| 4.3  | Power Electronics                               | M | 64  | 48  |  | 5 |   |
| 4.4  | Microprocessors                                 | M | 64  | 48  |  | 5 |   |
| 4.5  | Electronics Design and Simulation Techniques    | M | -   | 96  |  | 5 |   |
| 4.6  | Generic Skills and Entrepreneurship Development | M | 48  | -   |  |   | 6 |
| <b>Student Centred Activities including Entrepreneurial Awareness Camp</b> |   | M | -   | 64  |  | 5 |   |
| <b>Total</b>   |   |   | 288 | 352 |  |   |   |

| <b>FIFTH SEMESTER</b>  |  |   |     |     |  |   |  |
|--|--|---|-----|-----|--|---|--|
| 5.1  | Audio Video Systems                    | M | 48  | 32  |  | 5 |  |
| 5.2  | Computer Networks                      | M | 48  | 48  |  | 5 |  |
| 5.3  | Optical Fiber Communication            | M | 64  | 32  |  | 5 |  |
| 5.4  | Digital Communication                  | M | 64  | 32  |  | 5 |  |
| 5.5  | Micro controllers and Embedded Systems | M | 64  | 48  |  | 5 |  |
| 5.6  | PLCs and SCADA                         | M | 48  | 48  |  | 5 |  |
| -  | Industrial Training                    | M | -   | -   |  | 5 |  |
| <b>Student Centred Activities including Personality Development Camp</b> |  | M | -   | 64  |  | 5 |  |
| <b>Total</b>   |  |   | 336 | 304 |  |   |  |

| <b>SIXTH SEMESTER</b> |  |   |     |     |   |   |   |
|-----------------------|--|---|-----|-----|---|---|---|
| 6.1                   | VLSI System Design   | M | 64  | 48  |   | 5 |   |
| 6.2                   | Microwave and Radar Engineering  | M | 64  | 48  | - | 5 |   |
| 6.3                   | Wireless and Mobile Communication  | M | 64  | 48  | - | 5 |   |
| 6.4                   | Basics of Management   | M | 48  | -   |   |   | 6 |
| 6.5a                  | Digital Signal Processing  | O | 64  | -   |   |   | 6 |
| 6.5b                  | Medical Electronics  | O | 64  | -   |   |   | 6 |
| 6.5c                  | Introduction to Robotics   | O | 64  | -   |   |   | 6 |
| 6.6                   | Project Work   | M | -   | 128 | - | 5 |   |
|                       | <b>Student Centred Activities including Personality Development Camp</b> | M | -   | 64  | - | 5 |   |
|                       | <b>Total</b>   | - | 304 | 336 |   |   |   |

**Grand Total Number of Education & Training (excluding examination) = (1920 +1920) = 3840 Hrs**



## ASSESSMENT OF EVIDENCE

## Annexure-III

| 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 Evaluation Strategy given in curriculum | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> <li>• Report writing, presentation and viva-voce</li> </ul> |            | 5 |   |
| 2.  | Applied Mathematics              | Apply basic principles of mathematics to solve engineering problems |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>   |            | 5 |   |
| 3.  | Applied Physics                  | Apply basic principles of physics to solve engineering problems     |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, exercises and viva-voce</li> </ul>  |            | 5 |   |
| 4.  | Applied Chemistry                | Apply basic principles of Chemistry to solve engineering problems   |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, exercises and viva-voce</li> </ul>  |            | 5 |   |

|    |                                  |   |  |   |  |   |  |
|----|----------------------------------|---|--|---|--|---|--|
| 5. | Engineering Drawing              | Prepare and interpret drawings of engineering components  |  | <ul style="list-style-type: none"> <li>• Design and drawing</li> <li>• Assignments and quiz/class tests, mid-term and end-term written tests</li> </ul>   |  | 5 |  |
| 6. | General Workshop Practice        | Use cutting tools, equipment and tooling for fabrication of jobs by following safe practices at the workplace |  | <ul style="list-style-type: none"> <li>• Workshop job</li> <li>• Report writing, presentation and viva-voce</li> </ul>  |  | 5 |  |
| 7. | Basics of Information Technology | Prepare computerized reports, presentations using IT tools and computer application software                  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests</li> <li>• Software installation, operation, development and viva-voce</li> </ul>  |  | 5 |  |
| 8. | Basic Electronics                | Use electronic instruments to measure various engineering parameters  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |  |
| 9. | Basic Electrical Engineering     | Measure parameters of basic electrical engineering  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |  |

|     |  |  |  |   |  |   |  |
|-----|--|--|--|---|--|---|--|
| 10. | Environmental Studies  | Use appropriate procedures for preventing environmental pollution and energy conservation  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>   |  | 5 |  |
| 11. | Electronic Instruments and Measurement                       | Assemble, test and troubleshoot electronic circuits consisting of passive and active components by applying appropriate testing and measurement techniques |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |  |
| 12. | Principles of Communication Engineering Communication System | Design and troubleshoot different analog communication systems   |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |  |
| 13. | Digital Electronics Electronic Devices and Circuits          | Design and troubleshoot analog and digital electronic circuits   |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |  |
| 14. | Electrical Machines  | Use electrical machines and equipment  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>   |  | 5 |  |

|     |  |  |  |   |  |   |  |
|-----|--|--|--|---|--|---|--|
| 15. | Computer Programming using C           | Write basic programmes using C   |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, exercises and viva-voce</li> <li>• Software installation, operation, development and viva-voce</li> </ul> |  | 5 |  |
| 16. | Network Filters and Transmission Lines | Apply principles of various networks, filters and transmission lines and their associated parameters |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul>                       |  | 5 |  |
| 17. | Power Electronics                      | Measure parameters of various power devices and industrial equipment                                 |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul>                       |  | 5 |  |
| 18. | Microprocessor                         | Use microprocessor based system using assembly level language programming                            |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul>                       |  | 5 |  |

|     |   |  |  |   |   |   |
|-----|---|--|--|---|---|---|
| 19. | Electronics Design and Simulation Techniques    | Fabricate PCBs and design the layout of various instruments and equipment for wiring/circuit development |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> | 5 |   |
| 20. | Generic Skills and Entrepreneurship Development | Plan and execute given task/project as a team member/leader  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |   | 6 |
| 21. | Audio Video Systems                             | Use various digital audio-video transmission techniques and systems                                      |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>   | 5 |   |
| 22. | Computer Networks                               | Install a computer system and network  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> | 5 |   |
| 23. | Optical Fiber Communication                     | Demonstrate analog and digital transmission using optical fiber  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> | 5 |   |

|     |  |   |  |   |  |   |  |
|-----|--|---|--|---|--|---|--|
| 24. | Digital Communication                  | Troubleshoot different digital communication systems                                    |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>   |  | 5 |  |
| 25. | Micro controllers and Embedded Systems | Use microcontroller based system including assembly and high level language programming |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |  |
| 26. | PLC and SCADA                          | Use PLCs using hand held and computer based programming                                 |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |  |
| 27. | VLSI System Design                     | Develop models of basic logic circuits using VHDL.                                      |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |  |
| 28. | Microwave and Radar Engineering        | Measure parameters of various active and passive microwave devices and components       |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |  |

|     |                                   |  |  |   |  |   |   |
|-----|-----------------------------------|--|--|---|--|---|---|
| 29. | Wireless and Mobile Communication | Use various mobile communication systems and their multiple access techniques        |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul> |  | 5 |   |
| 30. | Basics of Management              | Manage resources effectively at the workplace  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>   |  |   | 6 |
| 31. | Digital Signal Processing         | Apply basic principles of Digital Signal Processing                                  |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>   |  |   | 6 |
| 32. | Medical Electronics               | Troubleshoot basic medical electronic equipment                                      |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>   |  |   | 6 |
| 33. | Introduction to Robotics          | Use microcontrollers in fabricating and programming basic robots.                    |  | <ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>   |  |   | 6 |
| 34. | Project Work                      | Apply acquired knowledge and skill in solving a live problem/project in the industry |  | <ul style="list-style-type: none"> <li>• Project development, model/prototype making</li> <li>• Report writing, presentation and viva-voce</li> </ul>   |  | 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  | <ul style="list-style-type: none"> <li>Desired understanding of skills of communication</li> </ul>   |            | 5 |   |
| 2.  | Applied Mathematics              | Apply basic principles of mathematics to solve engineering problems   | <ul style="list-style-type: none"> <li>Desired cognitive and mathematical skills to solve problems</li> </ul>  |            | 5 |   |
| 3.  | Applied Physics                  | Apply basic principles of physics to solve engineering problems   | <ul style="list-style-type: none"> <li>Desired cognitive and applied skills to solve problems</li> </ul>   |            | 5 |   |
| 4.  | Applied Chemistry                | Apply basic principles of Chemistry to solve engineering problems   | <ul style="list-style-type: none"> <li>Desired cognitive and applied skills to solve problems</li> </ul>   |            | 5 |   |
| 5.  | Engineering Drawing              | Prepare and interpret drawings of engineering components  | <ul style="list-style-type: none"> <li>A range of cognitive and practical skills required to draw, read and interpret drawings and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul> |            | 5 |   |
| 6.  | General Workshop Practice        | Use cutting tools, equipment and tooling for fabrication of jobs by following safe practices at the workplace | <ul style="list-style-type: none"> <li>A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>                  |            | 5 |   |



|     |  |  |  |  |   |  |
|-----|--|--|--|--|---|--|
| 7.  | Basics of Information Technology       | Prepare computerized reports, presentations using IT tools and computer application software   | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> <li>• Collecting and organising information and communication</li> <li>• Responsibility for own work and learning and some responsibility for others' works and learning</li> </ul> |  | 5 |  |
| 8.  | Basic Electronics                      | Use electronic instruments to measure various engineering parameters   | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>   |  | 5 |  |
| 9.  | Basic Electrical Engineering           | Measure parameters of basic electrical engineering   | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>   |  | 5 |  |
| 10. | Environmental Studies                  | Use appropriate procedures for preventing environmental pollution and energy conservation  | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> </ul>  |  | 5 |  |
| 11. | Electronic Instruments and Measurement | Assemble, test and troubleshoot electronic circuits consisting of passive and active components by applying appropriate testing and measurement techniques | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>   |  | 5 |  |

|     |   |  |  |  |   |  |
|-----|---|--|--|--|---|--|
| 12. | Principles of Communication Engineering<br>Communication System | Design and troubleshoot different analog communication systems                                       | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul> |  | 5 |  |
| 13. | Digital Electronics<br>Electronic Devices and Circuits          | Design and troubleshoot analog and digital electronic circuits                                       | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul> |  | 5 |  |
| 14. | Electrical Machines   | Use electrical machines and equipment  | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information</li> </ul>            |  | 5 |  |
| 15. | Computer Programming using C                                    | Write basic programmes using C   | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study</li> </ul>   |  | 5 |  |
| 16. | Network Filters and Transmission Lines                          | Apply principles of various networks, filters and transmission lines and their associated parameters | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> </ul>  |  | 5 |  |

|     |   |  |  |  |   |   |
|-----|---|--|--|--|---|---|
| 17. | Power Electronics                               | Measure parameters of various power devices and industrial equipment                                     | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information</li> </ul>  |  | 5 |   |
| 18. | Microprocessor                                  | Use microprocessor based system using assembly level language programming                                | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>   |  | 5 |   |
| 19. | Electronics Design and Simulation Techniques    | Fabricate PCBs and design the layout of various instruments and equipment for wiring/circuit development | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>   |  | 5 |   |
| 20. | Generic Skills and Entrepreneurship Development | Plan and execute given task/project as a team member/leader  | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study</li> <li>• Understanding of organising information and logical communication</li> <li>• Responsibility for own work and learning and full responsibility for other's works and learning</li> </ul> |  |   | 6 |

|     |                             |   |  |  |   |  |
|-----|-----------------------------|---|--|--|---|--|
| 21. | Audio Video Systems         | Use various digital audio-video transmission techniques and systems | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> <li>• Desired mathematical skill; understanding and some skill of collecting and organising information, communication</li> </ul>   |  | 5 |  |
| 22. | Computer Networks           | Install a computer system and network                               | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information</li> <li>• Desired mathematical skill; understanding of social, political; and some skill of collecting and organising information, communication</li> <li>• Responsibility for own work and learning and some responsibility for others' works and learning</li> </ul> |  | 5 |  |
| 23. | Optical Fiber Communication | Demonstrate analog and digital transmission using optical fiber     | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information</li> <li>• Responsibility for own work and learning</li> </ul>  |  | 5 |  |

|     |  |   |   |  |   |  |
|-----|--|---|---|--|---|--|
| 24. | Digital Communication                  | Troubleshoot different digital communication systems                                    | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information</li> <li>• Responsibility for own work and learning</li> </ul>   |  | 5 |  |
| 25. | Micro controllers and Embedded Systems | Use microcontroller based system including assembly and high level language programming | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools and information</li> </ul>  |  | 5 |  |
| 26. | PLC and SCADA                          | Use PLCs using hand held and computer based programming                                 | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study</li> <li>• Reasonable good in mathematical calculation, understanding and reasonably good in data collecting, organising information, and logical communication</li> <li>• Responsibility for own work and learning and full responsibility for other's works and learning</li> </ul> |  | 5 |  |

|     |                                   |   |   |  |   |  |
|-----|-----------------------------------|---|---|--|---|--|
| 27. | VLSI System Design                | Develop models of basic logic circuits using VHDL.                                | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> <li>• Desired mathematical skill; understanding and some skill of collecting and organising information, communication</li> <li>• Responsibility for own work and learning and some responsibility for others' works and learning</li> </ul> |  | 5 |  |
| 28. | Microwave and Radar Engineering   | Measure parameters of various active and passive microwave devices and components | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study</li> <li>• Reasonable good in mathematical calculation, understanding and reasonably good in data collecting, organising information, and logical communication</li> </ul>  |  | 5 |  |
| 29. | Wireless and Mobile Communication | Use various mobile communication systems and their multiple access techniques     | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study</li> <li>• Reasonable good in mathematical calculation, understanding and reasonably good in data collecting, organising information, and logical communication</li> </ul>  |  | 5 |  |

|     |                           |   |  |  |  |   |
|-----|---------------------------|---|--|--|--|---|
| 30. | Basics of Management      | Manage resources effectively at the workplace       | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study</li> </ul>   |  |  | 6 |
| 31. | Digital Signal Processing | Apply basic principles of Digital Signal Processing | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study</li> <li>• Reasonable good in mathematical calculation, understanding and reasonably good in data collecting, organising information, and logical communication</li> </ul> |  |  | 6 |
| 32. | Medical Electronics       | Troubleshoot basic medical electronic equipment     | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study</li> <li>• Reasonable good in mathematical calculation, understanding and reasonably good in data collecting, organising information, and logical communication</li> </ul> |  |  | 6 |

|     |                          |  |   |  |  |   |
|-----|--------------------------|--|---|--|--|---|
| 33. | Introduction to Robotics | Use microcontrollers in fabricating and programming basic robots.                    | <ul style="list-style-type: none"> <li>• Factual and theoretical knowledge in broad contexts within a field of work or study</li> <li>• A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study</li> <li>• Reasonable good in mathematical calculation, understanding and reasonably good in data collecting, organising information, and logical communication</li> </ul>  |  |  | 6 |
| 34. | Project Work             | Apply acquired knowledge and skill in solving a live problem/project in the industry | <ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> <li>• Desired mathematical skill; understanding and some skill of collecting and organising information, communication</li> <li>• Responsibility for own work and learning and some responsibility for others' works and learning</li> </ul> |  |  |   |