LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

JOB ROLE:
Optical Fiber Technician
(QUALIFICATION PACK: Ref. Id. TEL/Q6401)
SECTOR: Telecom

Classes 11 and 12

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal – 462 002, M.P., India
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FOREWORD

The Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE) a constituent of the National Council of Educational Research and Training (NCERT) is spearheading the efforts of developing learning outcome based curricula and courseware aimed at integrating both vocational and general qualifications to open pathways of career progression for students. It is a part of Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education (CSSVSHSE) launched by the Ministry of Human Resource Development, Government of India in 2012. The PSS Central Institute of Vocational Education (PSSCIVE) is developing curricula under the project approved by the Project Approval Board (PAB) of *Rashtriya Madhyamik Shiksha Abhiyan* (RMSA). The main purpose of the competency based curricula is to bring about the improvement in teaching-learning process and working competences through learning outcomes embedded in the vocational subject.

It is a matter of great pleasure to introduce this learning outcome based curriculum as part of the vocational training packages for the job role of **Telecom – Optical Fiber Technician**. The curriculum has been developed for the secondary students of vocational education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National Skill Qualification Framework (NSQF).

The curriculum aims to provide children with employability and vocational skills to support occupational mobility and lifelong learning. It will help them to acquire specific occupational skills that meet employers' immediate needs. The teaching process is to be performed through the interactive sessions in classrooms, practical activities in laboratories and workshops, projects, field visits, and professional experiences.

The curriculum has been developed and reviewed by a group of experts and their contributions are greatly acknowledged. The utility of the curriculum will be adjudged by the qualitative improvement that it brings about in teaching-learning. The feedback and suggestions on the content by the teachers and other stakeholders will be of immense value to us in bringing about further improvement in this document.

Hrushikesh Senapaty
Director
National Council of Educational Research & Training

PREFACE

India today stands poised at a very exciting juncture in its saga. The potential for achieving inclusive growth are immense and the possibilities are equally exciting. The world is looking at us to deliver sustainable growth and progress. To meet the growing expectations, India will largely depend upon its young workforce. The much-discussed demographic dividend will bring sustaining benefits only if this young workforce is skilled and its potential is channelized in the right direction.

In order to fulfill the growing aspirations of our youth and the demand of skilled human resource, the Ministry of Human Resource Development (MHRD), Government of India introduced the revised Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education that aims to provide for the diversification of educational opportunities so as to enhance individual employability, reduce the mismatch between demand and supply of skilled manpower and provide an alternative for those pursuing higher education. For spearheading the scheme, the PSS Central Institute of Vocational Education (PSSCIVE) was entrusted the responsibility to develop learning outcome based curricula, student workbooks, teacher handbooks and e-learning materials for the job roles in various sectors, with growth potential for employment.

The PSSCIVE firmly believes that the vocationalisation of education in the nation need to be established on a strong footing of philosophical, cultural and sociological traditions and it should aptly address the needs and aspirations of the students besides meeting the skill demands of the industry. The curriculum, therefore, aims at developing the desired professional, managerial and communication skills to fulfill the needs of the society and the world of work. In order to honour its commitment to the nation, the PSSSCIVE has initiated the work on developing learning outcome based curricula with the involvement of faculty members and leading experts in respective fields. It is being done through the concerted efforts of leading academicians, professionals, policy makers, partner institutions, Vocational Education and Training experts, industry representatives, and teachers. The expert group through a series of consultations, working group meetings and use of reference materials develops a National Curriculum. Currently, the Institute is working on developing curricula and courseware for over 100 job roles in various sectors.

We extend our gratitude to all the contributors for selflessly sharing their precious knowledge, acclaimed expertise, and valuable time and positively responding to our request for development of curriculum. We are grateful to MHRD and NCERT for the financial support and cooperation in realising the objective of providing learning outcome based modular curricula and courseware to the States and other stakeholders under the PAB (Project Approval Board) approved project of *Rashtriya Madhyamik Shiskha Abhiyan* (RMSA) of MHRD.

Finally, for transforming the proposed curriculum design into a vibrant reality of implementation, all the institutions involved in the delivery system shall have to come together with a firm commitment and they should secure optimal community support. The success of this curriculum depends upon its effective implementation and it is expected that the managers of vocational education and training system, including subject teachers will make efforts to create better facilities, develop linkages with the world of work and foster a conducive environment as per the content of the curriculum document.

The PSSCIVE, Bhopal remains committed in bringing about reforms in the vocational education and training system through the learner-centric curricula and courseware. We hope that this document will prove useful in turning out more competent Indian workforce for the 21st Century.

RAJESH P. KHAMBAYAT
Joint Director
PSS Central Institute of Vocational Education

ACKNOWLEDGEMENT

On behalf of the team at the PSS Central Institute of Vocational Education (PSSCIVE) we are grateful to the members of the Project Approval Board (PAB) *of* Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and the officials of the Ministry of Human Resource Development (MHRD), Government of India for the financial support to the project for development of curricula.

We are grateful to the Director, NCERT for his support and guidance. We also acknowledge the contributions of our colleagues at the Technical Support Group of RMSA, MHRD, RMSA Cell at the National Council of Educational Research and Training (NCERT), National Skill Development Agency (NSDA) and National Skill Development Corporation (NSDC) and Telecom Sector Skill Council of Indian (TSSC) for their academic support and cooperation.

We are grateful to the experts Prof. Prakash Khanale and coordinator, Dipak D. Shudhalwar, Associate Professor (CSE) and Head, Department of Engineering and Technology, PSSCIVE, Bhopal, for his earnest effort and contributions in the development of this learning outcome based curriculum. The contributions is dully acknowledged.

The contributions made by Vinay Swarup Mehrotra, Professor and Head, Curriculum Development and Evaluation Centre (CDEC), Vipin Kumar Jain, Associate Professor and Head, Programme Planning and Monitoring Cell (PPMC) and Dipak Shudhalwar, Associate Professor (CSE) and Head, Computer Centre, PSSCIVE in development of the curriculum for the employability skills are duly acknowledged.

We are also grateful to the Course Coordinator Dipak D. Shudhalwar, Associate Professor (CSE) and Head Computer Center, PSSCIVE, for bringing out this curriculum in the final form.

PSSCIVE Team

CONTENTS

1. COURSE OVERVIEW

COURSE TITLE: Optical Fiber Technician

Optical fiber technician is responsible for maintaining uptime and quality of the network segment (both optical media & equipment) assigned to him by undertaking periodic preventive maintenance activities and ensuring effective fault management in case of fault occurrence. He is also required to coordinate activities for installation and commissioning of Optical Fibre Cable (OFC) as per the route plan.

This job requires the individual to work closely with multiple teams and operate in field which may consist of difficult terrain. The individual should be able to handle high pressure situations and be analytical to successfully perform the assigned responsibilities. It is preferred that individual is well versed with local language to coordinate with local labors.

COURSE OUTCOMES: On completion of the course, students should be able to:

- ✓ Apply effective oral and written communication skills to interact with people and customers;
- ✓ Identify the principal components of a computer system;
- ✓ Demonstrate the basic skills of using computer;
- ✓ Demonstrate self-management skills;
- ✓ Demonstrate the ability to provide a self-analysis in context of entrepreneurial skills and abilities;
- ✓ Demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection;
- ✓ Acquaint self with facets of trenching, laying, jointing and blowing of cables by: authenticating and confirming cable drum is placed near site, cable marking is as per guideline, trenching is according to the route plan
- ✓ Comprehend inspecting criteria of route plan, clearance, schedule and patrolling by: acquiring route plans, their clearance and check for safety of the site for cable installation
- ✓ Identify importance of fault maintenance, maintenance of POPs and
- ✓ Repairs to OFC by: compliance to enterprise policy, coordinate with
- ✓ NOC and carry out planned maintenance.
- ✓ Aggregate potential knowledge and skill to vouchsafe the importance of health and safety by: safeguard compliance of safety regulations, personal protection and environmental conditions.
- ✓ Comprehend and initiate the importance of report and record by: ensuring cable id, cable markings, drum numbers, OTDR findings are Documented for future reference.

COURSE REQUIREMENTS: The learner should have basic knowledge of science.

COURSE LEVEL: This course can be taken up at Intermediate level in Class 11 and Class 12.

COURSE DURATION: **Total : 600 hrs**

Class 11 :	300 hrs
Class 12 :	300 hrs
Total:	**600 hrs**

2. SCHEME OF UNITS AND ASSESSMENT

This course is a planned sequence of instructions consisting of Units meant for developing employability and vocational competencies of students of Class 11 and 12 opting for vocational subject along with general education subjects. The unit-wise distribution of hours and marks for Class 11 is as follows:

CLASS 11			
	Units	**No. of Hours for Theory and Practical 300**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
	Unit 1: Communication Skills	25	**10**
	Unit 2: Self-management Skills	25	
	Unit 3: Basic ICT Skills	20	
	Unit 4: Entrepreneurial Skills	25	
	Unit 5: Green Skills	15	
	Total	**110**	**10**
Part B	**Vocational Skills**		
	Unit 1: Fundamentals of optical fiber technology	45	**40**
	Unit 2: Tools and equipment and safety precautions	40	
	Unit 3: Installation of optical fiber cable (OFC)	40	
	Unit 4: Optical Fiber Health & Safety	40	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	6	15
	Written Test	1	10
	Viva Voce	3	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/ Student Portfolio	10	10
	Viva Voce	5	5
	Total	**15**	**15**
	Total	**300**	**100**

The unit-wise distribution of hours and marks for **Class 12** is as follows:

CLASS 12			
	Units	**No. of Hours for Theory and Practical 300**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
	Unit 1: Communication Skills	25	**10**
	Unit 2: Self-management Skills	25	
	Unit 3: Basic ICT Skills	20	
	Unit 4: Entrepreneurial Skills	25	
	Unit 5: Green Skills	15	
	Total	**110**	**10**
Part B	**Vocational Skills**		
	Unit 1: Introduction to Optical Fiber Industry	30	**40**
	Unit 2: Optical Fibre Cable and Tools	45	
	Unit 3: Installation of Optical Fiber Cable	45	
	Unit 4: Fault Restoration, Safety Measures and Networking	45	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	6	15
	Written Test	1	10
	Viva Voce	3	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/ Student Portfolio	10	10
	Viva Voce	5	5
	Total	**15**	**15**
	Total	**300**	**100**

3. TEACHING/TRAINING ACTIVITIES

The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with experts and to expose them to the various tools, equipment, materials, procedures and operations in the workplace.

Special emphasis should be laid on the occupational safety, health and hygiene during the training and field visits.

CLASSROOM ACTIVITIES

Classroom activities are an integral part of this course and interactive lecture sessions, followed by discussions should be conducted by trained vocational teachers. Vocational teachers should make effective use of a variety of instructional aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, hand-outs, online teaching materials, etc. to transmit knowledge and impart training to the students.

PRACTICAL WORK IN LABORATORY/WORKSHOP

Practical work may include but not limited to hands-on-training, simulated training, role play, case based studies, exercises, etc. Equipment and supplies should be provided to enhance hands-on learning experience of students. Only trained personnel should teach specialized techniques. A training plan that reflects tools, equipment, materials, skills and activities to be performed by the students should be submitted by the vocational teacher to the Head of the Institution.

FIELD VISITS/ EDUCATIONAL TOUR

In field visits, children will go outside the classroom to obtain specific information from experts or to make observations of the activities. A checklist of observations to be made by the students during the field visits should be developed by the Vocational Teachers for systematic collection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for field visits within a short distance from the school and make necessary arrangements for the visits. At least three field visits should be conducted in a year.

4. ASSESSMENT AND CERTIFICATION

Upon successful completion of the course by the candidate, the Central/ State Examination Board for Secondary Education and the respective Sector Skill Council will certify the competencies.

The National Skills Qualifications Framework (NSQF) is based on outcomes referenced to the National Occupation Standards (NOSs), rather than inputs. The NSQF level descriptors, which are the learning outcomes for each level, include the process, professional knowledge, professional skills, core skills and responsibility. The assessment is to be undertaken to verify that individuals have the knowledge and skills needed to perform a particular job and that the learning programme undertaken has delivered education at a given standard. It should be closely linked to certification so that the individual and the employer could come to know the competencies acquired through the vocational subject or course. The assessment should be reliable, valid, flexible, convenient, cost effective and above all it should be fair and transparent. Standardized assessment tools should be used for assessment of knowledge of students. Necessary arrangements should be made for using technology in assessment of students.

KNOWLEDGE ASSESSMENT (THEORY)

Knowledge Assessment should include two components: one comprising of internal assessment and second an external examination, including theory examination to be conducted by the Board. The assessment tools shall contain components for testing the knowledge and application of knowledge. The knowledge test can be objective paper based test or short structured questions based on the content of the curriculum.

WRITTEN TEST

It allows candidates to demonstrate that they have the knowledge and understanding of a given topic. Theory question paper for the vocational subject should be prepared by the subject experts comprising group of experts of academicians, experts from existing vocational subject experts/teachers, and subject experts from university/colleges or industry. The respective Sector Skill Council should be consulted by the Central/State Board for preparing the panel of experts for question paper setting and conducting the examinations.

The blue print for the question paper may be as follows:

Duration: 3 hrs **Max. Mark: 30**

		No. of Questions			
	Typology of Question	**Very Short Answer (1 mark)**	**Short Answer (2 Marks)**	**Long Answer (3 Marks)**	**Marks**
1.	Remembering – (Knowledge based simple recall questions, to know specific facts, terms, concepts, principles, or theories; identify, define or recite, information)	**3**	**2**	**2**	**13**
2.	Understanding – (Comprehension – to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information)	**2**	**3**	**2**	**14**
3.	Application – (Use abstract information in concrete situation, to apply knowledge to new situations: Use given content to interpret a situation, private an example, or solve a problem)	**0**	**2**	**1**	**07**
4.	High Order Thinking Skills – (Analysis & Synthesis – Classify, compare, contrast, or differentiate between different pieces of information; Organize and/ or integrate unique pieces of information from a variety of sources)	**0**	**2**	**0**	**04**
5.	Evaluation – (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	**0**	**1**	**0**	**02**
	Total	**5x1=5**	**10x2=20**	**5x3=15**	**40 (20 Ques.)**

SKILL ASSESSMENT (PRACTICAL)

Assessment of skills by the students should be done by the assessors/examiners on the basis of practical demonstration of skills by the candidate, using a competency checklist. The competency checklist should be developed as per the National Occupation Standards (NOSs) given in the Qualification Pack for the Job Role to bring about necessary consistency in the quality of assessment across different sectors and Institutions. The student has to demonstrate competency against the performance criteria defined in the National Occupation Standards and the assessment will indicate that they are 'competent', or are 'not yet competent'. The assessors assessing the skills of the students should possess a current experience in the industry and should have undergone an effective training in assessment principles and practices. The Sector Skill Councils should ensure that the assessors are provided with the training on the assessment of competencies.

Practical examination allows candidates to demonstrate that they have the knowledge and understanding of performing a task. This will include hands-on practical exam and viva voce. For practical, there should be a team of two evaluators – the subject teacher and the expert from the relevant industry certified by the Board or concerned Sector Skill Council. The same team of examiners will conduct the viva voce.

Project Work (individual or group project) is a great way to assess the practical skills on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organised as part of the project work. Field visits can be followed by a small-group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations. Project work should be assessed on the basis of practical file or student portfolio.

Student Portfolio is a compilation of documents that supports the candidate's claim of competence. Documents may include reports, articles, photos of products prepared by students in relation to the unit of competency.

Viva voce allows candidates to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. The number of external examiners would be decided as per the existing norms of the Board and these norms should be suitably adopted/adapted as per the specific requirements of the vocational subject. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

CONTINUOUS AND COMPREHENSIVE EVALUATION

Continuous and Comprehensive Evaluation (CCE) refers to a system of school-based evaluation of students that covers all aspects of student's development. In this scheme, the term `continuous' is meant to emphasize that evaluation of identified aspects of students `growth and development' is a continuous process rather than an event, built into the total teaching-learning process and spread over the entire span of academic session. The second term `comprehensive' means that the scheme attempts to cover both the scholastic and the co-scholastic aspects of students' growth and development. For details, the CCE manual of Central Board of Secondary Education (CBSE) or the guidelines issued by the State Boards on the procedure for CCE should be followed by the Institutions.

5. UNIT CONTENTS

CLASS 11

Part A: Employability Skills

Sn	Units	Duration in Hours
1.	Unit 1: Communication Skills – III	25
2.	Unit 2: Self-management Skills – III	25
3.	Unit 3: Basic ICT Skills – III	20
4.	Unit 4: Entrepreneurial Skills – III	25
5.	Unit 5: Green Skills – III	15
	Total	**110**

Unit 1: Communication Skills – III				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25 Hrs**
1.	Demonstrate knowledge of various methods of communication	• Methods of communication • Verbal • Non-verbal • Visual	• Writing pros and cons of written, verbal and non-verbal communication • Listing do's and don'ts for avoiding common body language mistakes	15
2.	Identify specific communication styles	• Communication styles- assertive, aggressive, passive-aggressive, submissive, etc.	• Observing and sharing communication styles of friends, teachers and family members and adapting the best practices • Role plays on communication styles.	10
3.	Demonstrate basic writing skills	• Writing skills to the following: • Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles • Construction of a Paragraph	• Demonstration and practice of writing sentences and paragraphs on topics related to the subject	15
			Total Duration in Hours	**25**

Unit 2: Self-management Skills – III				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25 Hrs**
1.	Demonstrate impressive	• Describe the importance of dressing appropriately, looking	• Demonstration of impressive appearance and groomed	07

	appearance and grooming	decent and positive body language. • Describe the term grooming • Prepare a personal grooming checklist. • Describe the techniques of self-exploration.	personality. • Demonstration of the ability to self- explore.	
2.	Demonstrate team work skills	• Describe the important factors that influence in team building. • Describe factors influencing team work.	• Group discussion on qualities of a good team. • Group discussion on strategies that are adopted for team building and team work.	08
3.	Apply time management strategies and techniques	• Meaning and importance of time management – setting and prioritizing goals, creating a schedule, making lists of tasks, balancing work and leisure, using different optimization tools to break large tasks into smaller tasks.	• Game on time management. • Checklist preparation. • To-do-list preparation.	10
			Total Duration in Hours	**25**

Unit 3: Basic ICT Skills – III				
Sn	**Learning Outcome**	**Theory (08 Hours)**	**Practical (12 Hours)**	**20 Hrs**
1.	Create a document on word processor	• Introduction to word processing. • Software packages for word processing. • Opening and exiting the word processor. • Creating a document	• Demonstration and practice of the following: • Listing the features of word processing, • Listing the software packages for word processing, • Opening and exit the word processor, • Creating a document	10
2.	Edit, save and print a document in word processor	• Editing text • Wrapping and aligning the text • Font size, type and face. • Header and Footer • Auto correct • Numbering and bullet • Creating table • Find and replace • Page numbering. • Printing document. • Saving a document in various formats	• Demonstration and practicing the following: • Editing the text • Word wrapping and alignment, • Changing font type, size and face, • Inserting header and footer, • Removing header and footer, • Using autocorrect option, • Insert page numbers and bullet, • Save and print a document.	10
			Total Duration in Hours	**20**

Unit 4: Entrepreneurial Skills – III				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25 Hrs**
1.	Describe the significance of entrepreneurial values and attitude.	• Values in general and entrepreneurial values. Entrepreneurial value orientation with respect to inattentiveness, independence, outstanding performance and respect for work.	• Listing of entrepreneurial values by the students. • Group work on identification of entrepreneurial values and their roles after listing or reading 2-3 stories of successful entrepreneur. • Exhibiting entrepreneurial values in Ice breaking, rapport building, group work and home assignments.	10
2.	Demonstrate the knowledge of attitudinal changes required to become an entrepreneur.	• Attitudes in general and entrepreneurial attitudes • Using imagination/ intuition • Tendency to take moderate risk • Enjoying freedom of expression and action • Looking for economic opportunities • Believing that we can change the environment • Analyzing situation and planning action • Involving in activity	• Preparing a list of factors that influence attitude in general and entrepreneurial attitude. • Demonstrating and identifying own entrepreneurial attitudes during the following micro lab activities like thematic appreciation test. • Preparing a short write-up on "who am I". • Take up a product and suggest how its features can be improved. • Group activity for suggesting brand names, names of enterprises, etc.	15
			Total Duration in Hours	**25**

Unit 5: Green Skills – III				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (08 Hours)**	**15 Hrs**
1.	Describe importance of main sector of green economy	• Main sectors of green economy- E-waste management, green transportation, renewal energy,green construction, water management. • Policy initiatives for greening economy in India.	• Preparing a poster on any one of the sectors of green economy. • Writing a two-page essay on important initiatives taken in India for promoting green economy.	08
2.	Describe the major green Sectors/ Areas and the role of various stakeholder in green economy	• Stakeholders in green economy. • Role of government and private agencies in greening cities, buildings, tourism, industry, transport, renewable energy, waste management,	• Preparing posters on green Sectors/Areas: cities, buildings, tourism, industry, transport, renewable energy, waste management, agriculture, water, forests and fisheries.	07

		agriculture, water, forests and fisheries.		
			Total Duration in Hours	**15**

Class XI, Part B: Vocational Skills

Sn	Units	Duration in Hours
1.	Unit 1: Fundamentals of optical fiber technology	45
2.	Unit 2: Tools and equipment and safety precautions	40
3.	Unit 3: Installation of optical fiber cable (OFC)	40
4.	Unit 4: Optical Fiber Health & Safety	40
	Total Duration	**165**

Unit 1: Fundamentals of Optical Fiber Technology				
Sn	**Learning Outcome**	**Theory (20 Hours)**	**Practical (25 Hours)**	**45 Hrs**
1.	Appreciate the basics of fiber optics	• History and evolution of fiber optics, • Advantages/disadvantages of fiber optics, • Basics of a fiber optic communications system • Fiber optic standards • Applications of fiber optics • Common industry terminology.	• List the opportunities in the broadband industry, • Demonstrate the role of optical fiber technician, • Prepare the duties and responsibilities of optical fiber technician, • Gather the knowledge, skills and attitudes required by the optical fiber technician.	10
2.	Understand the concept of light propagation	• Nature of light • Propagation characteristics of light, • Electromagnetic spectrum, • Snell's law, critical angle • Reflection, Refraction, • Total internal reflection, • Refractive index, • Acceptance angle, • Acceptance cone, • Numerical aperture.	• Demonstrate an experiment for prorogation of light, • Verify the laws of reflection and refraction, total internal reflection, • Demonstrate the experiment to determine numerical aperture.	15
3.	Describe the types of optical fiber	• Structure of optical fiber, • Fiber optic – glass fibers, plastic fibers, fiber sizes, • Types of fiber based on modes of propagation – single mode and multi-mode fiber, step	• Identify and name different types of cables used in transmission media, • Draw the diagram of cable and name the different parts of cable.	10

		index and graded index fiber, • Fiber Specifications • Attenuation and dispersion.	•	
4.	Describe the types of optical fiber cable	• Different types of cables used in transmission media, • Structure of cable – types of buffering, • Types of cables – Indoor cables, outdoor cables, • Types of cables – cordage, distribution cable, breakout cable, Armored cable, messenger cable, ribbon cable, submarine cable, short and long run cables, hybrid, composite cables.	• Identify and name the various types of cable.	10
			Total Duration in Hours	**45**

Unit 2: Tools, Equipment and Components				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (25 Hours)**	**40 Hrs**
1.	Describe the light sources of optical fiber	• Structure of LED, • PN Junction, • Types of LED – surface emitting LED, Edge emitting LED • LED materials, • Uses of LED, • Advantages and disadvantages of LED, • Fiber-LED coupling, • LASERS diode operation, • Types of LASERs diodes, • Uses of LASER, • Comparison of LED and LASER diodes. • PIN diode	• Identify and list different types of LED, • Identify the material using LED, • Demonstrate an experiment to show difference between LASER diode light and white light components, • Demonstrate to use different sources for light propagation through the fibers. • Demonstrate the laser beam absorption as a function of filter colour and its coherent nature	10
2.	Identify and use fiber optic tools in tool kit	• Basic Hand Tools- screwdriver. cable cutting knife, Plier, scissors. Round tube cutter, Electrical tape, optical fiber stripper • Splicing tolls- optical fiber splicing machine, cleaver (scribe and precision), protection sleeve, mechanical	• Identify and name the tools in fiber optics tool kit, • Demonstrate the handling of the tools – • Tubbing cutter tool, • Rotary cable slitting tool, • Cable jacket stripper tool, • Fiber optics stripper tool, • Buffer tube stripper tool,	20

		splice connector, Matching Gel , clamp spring • Cleaning Tools-Cleaning swab, gloves. Tissue paper, Isopropyl alcohol • Testing tools – OTDR • Termination Kit- Optical connectors and its type • Tools for installing cables-Tubing cutter, Rotary cable slitting and ringing tool, cable jacket stripper, Buffer tube stripper	• Scissors tool, • Scribe tool, • pliers • OTDR, • Demonstrate the various types of connectors	
3.	Describe the specification of optical fiber cable	• Describe fiber optic cable specification – tensile strength, bend radius, crush and impact	• To understand optical fibre's tensile strength • Study bend radius of a cable.	10
			Total Duration in Hours	**40**

Unit 3: Conditional Maintenance and Safety Measures				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (25 Hours)**	**40 Hrs**
1.	Testing of optical fibre cables by conditional maintenance and planned repair activities	• Testing preparation • Testing optical fibre -visual fault locator, Inspection microscope • Visual connector inspection • Connector end cleaning procedure • Cleaning fibre ends • Bare fibre test • Optical return loss test • Methods for measuring return loss • Optical time domain reflectometers (OTDRs) • Elements of OTDR. • OTDR specification • Fibre optic power meters • Light source • Insertion loss tests	• Procedure to check the continuity of the optical fibre cable with Visual Fault Inspector • Working with the inspection microscope • The steps to be followed for visual connector inspection • Methods for measuring return loss using OTDR • To study trace of OTDR • Demonstrate the bare fiber test. • To test insertion loss in optical fibre	10
2.	Carrying out splicing in optical fibres	• Requirement of splicing: • Parameters to be considered to perform splicing • Types of splicing- Fusion splicing, Mechanical splicing • Selecting the splicing method • Testing of splicing • Splice problem troubleshooting	• Demonstrate the process of splicing • Demonstrate the working with the splicing machine • Demonstrate the testing of the parameters of splicing •	20

3.	Follow safety in handling tools	• Safety precautions in handling optical fibre, • Safety precautions in handling optical laser, • Bare fiber safety • Safety precautions related to optical fibre fire safety, • Precautions for optical fibre workmanship safety, • Safety in handling equipment of optical fibre, • Important safety guidelines for workman, • Cleanliness and safe work surroundings.	• Demonstrate the safety precautions in handling optical fibre, • Demonstrate the safety precautions in handling optical laser, • Demonstrate the safety precautions related to optical fibre fire safety, • List the precautions for optical fibre workmanship safety, • Demonstrate to handle the tools and equipment safely, • List the important safety guidelines for workman, • Demonstrate the cleanliness and safe work surroundings. • Demonstrate the first aid	10
			Total Duration in Hours	**40**

Unit 4: Site Visit and Optical Networking				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (10 Hours)**	**20 Hrs**
1.	Read and interpret OFC route plan	• OFC route plan, • Route inspection, • Route diagrams, • Different site condition. • Advantages of an effective rout inspection	• Identify the appropriate site conditions for cable laying • Draw the route plan for given site conditions, • Draw the route diagram for given site conditions.	10
2.	Inspect the site for safe and secure cable installation	• Safety and security of site • Various parameters to inspect the site	• Draw the cable laying plan for the proposed site • Identify the various parameters to ensure safety and security of site for cable laying.	10
3.	Link performance analysis	• The fibre optic link, • Link power budget, • Optical technologies – FTTX • Fibre in home cabling reference model, • Multiplexing.	• Calculate optical fibre link loss budget • Measure propagation or attenuation loss in optical fibre. • Measure the bending loss in fibre. • Measure propagation loss in optical fibre using optical power meter. • Install a Fibre broadband in your house.	20
			Total Duration in Hours	**40**

CLASS 12

Part A: Employability Skills

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills – IV	25
2.	Unit 2: Self-management Skills – IV	25
3.	Unit 3: Basic ICT Skills – IV	20
4.	Unit 4: Entrepreneurial Skills – IV	25
5.	Unit 5: Green Skills – IV	15
	Total	**110**

Unit 1: Communication Skills – IV				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25 Hrs**
1.	Describe the steps to active listening skills	• Importance of active listening at workplace • Steps to active listening.	• Demonstration of the key aspects of becoming active listener. • Preparing posters of steps for active listening.	10
2.	Demonstrate basic writing skills	• Writing skills to the following: • Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles • Construction of a Paragraph	• Demonstration and practice of writing sentences and paragraphs on topics related to the subject.	15
			Total Duration in Hours	**25**

Unit 2: Self-management Skills – IV				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25 Hrs**
1.	Describe the various factors influencing self-motivation	• Finding and listing motives (needs and desires); • Finding sources of motivation and inspiration (music, books, activities); expansive thoughts; living fully in the present moment; dreaming big.	• Group discussion on identifying needs and desire. • Discussion on sources of motivation and inspiration.	10
2.	Describe the basic personality traits, types and disorders	• Describe the meaning of personality. • Describe how personality influence others. • Describe basic personality traits.	• Demonstrate the knowledge of different personality types.	

		• Describe common personality disorders- paranoid, antisocial, schizoid, borderline, narcissistic, avoidant, dependent and obsessive.		15
			Total Duration in Hours	**25**

Unit 3: Basic ICT Skills – IV				
Sn	**Learning Outcome**	**Theory (06 Hours)**	**Practical (14 Hours)**	**20 Hrs**
1.	Perform tabulation using spreadsheet application	• Introduction to spreadsheet application, • Spreadsheet applications, • Creating a new worksheet, • Opening workbook and entering text, • Resizing fonts and styles, • Copying and moving, • Filter and sorting, • Formulas and functions, • Password protection, • Printing a spreadsheet, • Saving a spreadsheet in various formats.	• Demonstration and practice on the following: • Introduction to the spreadsheet application, • Listing the spreadsheet applications, • Creating a new worksheet, • Opening the workbook and enter text, • Resizing fonts and styles, • Copying and move the cell data, • Sorting and Filter the data, • Applying elementary formulas and functions, • Protecting the spreadsheet with password, • Printing a spreadsheet, • Saving the spreadsheet in various formats.	10
2.	Prepare presentation using presentation application	• Introduction to presentation, • Software packages for presentation, • Creating a new presentation, • Adding a slide, • Deleting a slide, • Entering and editing text, • Formatting text, • Inserting clipart and images, • Slide layout, • Saving a presentation, • Printing a presentation document.	• Demonstration and practice on the following: • Listing the software packages for presentation, • Explaining the features of presentation, • Creating a new presentation, • Adding a slide to presentation, • Deleting a slide, • Entering and edit text, • Formatting text, • Inserting clipart and images, • Sliding layout, • Saving a presentation, • Printing a presentation document.	10
			Total Duration in Hours	**20**

Unit 4: Entrepreneurial Skills – IV				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25 Hrs**
1.	Identify the general and entrepreneurial behavioral competencies	• Barriers to becoming entrepreneur. • Behavioral and entrepreneurial competencies – adaptability/decisiveness, initiative/perseverance, interpersonal skills, organizational skills, stress management, valuing service and diversity.	• Administering self-rating questionnaire and score responses on each of the competencies. • Collect small story/ anecdote of prominent successful entrepreneurs. • Identify entrepreneurial competencies reflected in each story and connect it to the definition of behavioral competencies. • Preparation of competency profile of students.	10
2.	Demonstrate the knowledge of self-assessment of behavioral competencies	• Entrepreneurial competency in particular: self-confidence, initiative, seeing and acting on opportunities, concern for quality, goal setting and risk taking, problem solving and creativity, systematic planning and efficiency, information seeking, persistence, influencing and negotiating, team building.	• Games and exercises on changing entrepreneurial behavior and development of competencies for enhancing self-confidence, problem solving, goal setting, information seeking, team building and creativity.	15
			Total Duration in Hours	**25**

Unit 5: Green Skills – IV				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (10 Hours)**	**15 Hrs**
1.	Identify the role and importance of green jobs in different sectors	• Role of green jobs in toxin-free homes. • Green organic gardening, public transport and energy conservation, • Green jobs in water conservation. • Green jobs in solar and wind power, waste reduction, reuse and recycling of wastes, • Green jobs in green tourism • Green jobs in building and construction. • Green jobs in appropriate technology. • Role of green jobs in Improving energy and raw materials use • Role of green jobs in limiting	• Listing of green jobs and preparation of posters on green job profiles. • Prepare posters on green jobs.	15

		greenhouse gas emissions • Role of green jobs minimizing waste and pollution • Role of green jobs in protecting and restoring ecosystems • Role of green jobs in support adaptation to the effects of climate change		
			Total Duration in Hours	**15**

Class XII, Part B: Vocational Skills

Sn	Units	Duration in Hours
1.	Unit 1: Introduction to Optical Fiber Industry	30
2.	Unit 2: Optical Fibre Cable and Tools	45
3.	Unit 3: Installation of Optical Fiber Cable	45
4.	Unit 4: Fault Restoration, Safety Measures and Networking	45
	Total Duration	**165**

Unit 1: Introduction to Optical Fiber Industry				
Sn	**Learning Outcome**	**Theory (12 Hours)**	**Practical (18 Hours)**	**30 Hrs**
1.	Understand the opportunities in the broadband industry	• Opportunities in the broadband industry – global and local scenario, • Role of optical fiber technician in telecom industry, • Duties and responsibilities of optical fiber technician, • Knowledge, skills and attitudes required by the optical fiber technician, • Public switched telephone network (PSTN), • History and evolution of fiber optic communication, • Transmission media, Important telecom terminologies, • Advantages of fiber optic communication in telecom industry.	• List the opportunities in the broadband industry, • Demonstrate the role of optical fiber technician • Prepare the duties and responsibilities of optical fiber technician, • Gather the knowledge, skills and attitudes required by the optical fiber technician. • Setting up the call in PSTN, • Identify and name the various transmission media.	**10**
2.	Read and interpret OFC route plan	• OFC route plan, • Route inspection, • Route diagrams, • Different site condition.	• Identify the appropriate site conditions for cable laying • Draw the route plan for given site conditions, • Draw the route diagram for given site conditions.	**10**

3.	Inspect the site for safe and secure cable installation	• Cable laying process in the various site conditions • Safety and security of site • Various parameters to inspect the site	• Draw the cable laying plan for the proposed site • Identify the various parameters to ensure safety and security of site for cable laying.	**10**
			Total Duration in Hours	**30**

Unit 2: Optical Fibre Cable and Tools				
Sn	**Learning Outcome**	**Theory (20 Hours)**	**Practical (25 Hours)**	**45 Hrs**
1.	Describe the types of optical fiber	• Structure of optical fiber, • Fiber optic – glass fibers, plastic fibers, fiber sizes, • Types of fiber based on modes of propagation – single mode and multi-mode fiber, step index and graded index fiber, • Fiber Specifications • Attenuation and dispersion.	• Identify and name different types of cables used in transmission media, • Draw the diagram of cable and name the different parts of cable.	10
2.	Describe the types of optical fiber cable	• Different types of cables used in transmission media, • Structure of cable – types of buffering, • Types of cables – Indoor cables, outdoor cables, • Types of cables – cordage, distribution cable, breakout cable, Armored cable, messenger cable, ribbon cable, submarine cable, short and long run cables, hybrid, composite cables. • NEC Standards for optical fiber • Cable markings and Color codes in optical fiber cables.	• Identify and name the various types of cable. • Demonstrate the color-coding scheme for individual Fibers bundled in a cable. • measuring out a length of cable using sequential markings.	15
3.	Understand fibre optic cable specification	• Fiber optic cable, • Fibre optic cable specification – tensile strength, bend radius, crush and impact, Diameter • Cable duty specifications	• Demonstrate the optical fibre's specification -strength, minimum bend radius of a cable •	05
4.	Identify and use fiber optic tools in tool kit	• Basic Hand Tools- screwdriver. cable cutting knife, Plier, scissors. Round tube cutter, Electrical tape, optical fiber stripper • Splicing tools- optical fiber	• Identify and name the tools in fiber optics tool kit, • Demonstrate the handling of the tools – • Tubbing cutter tool, • Rotary cable slitting tool,	15

		splicing machine, cleaver (scribe and precision), protection sleeve, mechanical splice connector, Matching Gel, clamp spring • Cleaning Tools-Cleaning swab • Tissue paper, Isopropyl alcohol • Testing tools-OTDR • Tools for installing cables-Tubing cutter, Rotary cable slitting and ringing tool, cable jacket stripper, Buffer tube stripper • Termination kit -connectors and its types. • use of various tools and equipment for cable laying process • Optical Spectrum Analyzer and its type.	• Cable jacket stripper tool, • Fiber optics stripper tool, • Buffer tube stripper tool, • scissors tool, • Scribe tool, • plier • OTDR, • Procedure to use various tools and equipment for cable laying process • Identify the various types of connectors • Demonstrate to handle tools and equipment with safety and care • Identify the various tools and equipment used for cable laying process, • Identify the various types of connectors, • Demonstrate to use the various tools for splicing and cable laying, • Demonstrate the spectrum analyzer	
			Total Duration in Hours	**45**

Unit 3: Installation of Optical Fiber Cable				
Sn	**Learning Outcome**	**Theory (20 Hours)**	**Practical (25 Hours)**	**45 Hrs**
3.	Demonstrate to handle OFC cables	• Identify factors affecting fiber optic cable- Factors effecting fibre optic cable – natural and man made • Cable drum, • Cable storage and handling, • Inspection of the drum and cable.	• Demonstrate the method of drum preparation, • Demonstrate the methods of cable storage and its handling. • Demonstrate the factors affecting the damage of cables	15
4.	Carry out cable laying	• Standard cable installation process, • Installation through trenching, aerial, • Ducting process, • Conduct figure 8' ing', • Cable pulling and blowing, • Fibre optic cable pull boxes, • OFC preparation- Cable Jacket removal, Removal of	• Demonstrate the method of trenching, • Demonstrate the method of aerial fiber cable installation • Demonstrate the procedure of cable pulling and cable blowing. • Demonstrate the methods of the cable preparation	15

		jacket using wire stripper.		
5.	Post implementation of fiber cables after laying	• Splicing procedure • Fusion splicing process, • Mechanical splicing process, • Testing of splicing, • Troubleshooting splicing • OFC termination, • Splice trays, • Splice enclosures.	• Demonstrate the fusion splicing process • Demonstrate the mechanical splicing process, • Test the splicing, • Troubleshoot the splicing • Demonstrate to install fibre optic cable in splice tray	15
			Total Duration in Hours	**45**

Unit 4: Fault Restoration, Safety Measures and Networking				
Sn	**Learning Outcome**	**Theory (20 Hours)**	**Practical (25 Hours)**	**45 Hrs**
1.	Test OFC using visual fault locator	• Fault notification-guidelines, • Fault notification process, • Fault localization and restoration, • Rectification, • Cable system faults, • Fault case of damage to an optical drop cable, • Results of investigation, • Reproduction of cable damage.	• Demostrarte the process of receiving the fault notification and restoration, • Demonstrate the different types of fault in fibre optics cable, • Demonstrate to prepare the problem identification flowchart, • Demonstrate the underground fibre optic cable repair.	15
2.	Observe safety measures during installation of OFC	• Material and chemical safety, • Underground safety, • Working safety, • Using personal protective equipment – helmet, eye and face protection. • LASER light safety, • Ladder safety, • Fiber safety in a trench.	• Demonstrate to follow the rules in handling chemicals for OFC installation. • Use the personal protective equipment, • Demonstrate the use of different classes of LASER, • Demonstrate the use of ladder in trench.	15
3.	Optical networking	• Li – Fi Technology, • Free Space Optics (FSO), • Digital Television, • Closed Circuit Television.	• Demonstrate the use of Li-Fi over Wi-Fi, • Demonstrate the working of Li-Fi Technology, • Demonstrate working of FSO, • Connecting an external device using an optical cable, • Connecting digital TV using an optical cable. • Demonstrate the working of CCTV camera.	15
			Total Duration in Hours	**45**

6. ORGANISATION OF FIELD VISITS

In a year, at least 3 field visits/educational tours should be organised for the students to expose them to the activities in the workplace.

Visit a optical fiber cable installation site and observe the following: Location, Site, Cable laying, splicing procedure, Cable installation, trenching, handling. During the visit, students should obtain the following information from the owner or the supervisor :

1. Installations, troubleshooting, and maintaining all fiber optic systems in businesses, homes, schools, and other organizations to ensure that they are working properly,
2. Measuring the signal strength of television, telephone and internet connections to ensure that there is adequate performance,
3. Creating sensors and performing inspections to make sure that the fiber optic systems do not have defects that could undermine performance,
4. Conducting regular inspections of the systems with the aim of locating and repairing any defects detected during the inspections,
5. Performing premises cabling and running fiber optic cables underground and underwater,
6. Determining solutions to any problems and issues that are preventing the fiber optic systems from performing optimally,
7. Constructing a proper slice case as well as preparing and maintaining records, diagrams and schematics relating to the splice case.

7. LIST OF EQUIPMENT AND MATERIALS

The list given below is suggestive and an exhaustive list should be prepared by the vocational teacher. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

Tools	Equipment	Materials
• Components / Dividers • Oscilloscope • Rulers • T-square • Multi-tester • Pliers • Cutters • Screw drivers • Goggles • Gloves • Protractor • Steel rule • LAN tester • Utility softwares • Anti-static wrist wrap • Masks • Crimping tools • Flashlights • Sharp pointed tweezers • Mirror (inspection)	• Hubs/switches • CDROMs • Modem/router • Printers • Hubs • Server • Peripherals • Desktop Computers • Laptops • Laser Printers • Ink Jet Printers • Dot Matrix Printers • Scanners • Soldering irons • Multimeters • Cabels • Network switch	• UTP Cat. 5 cables • UTP Cat. 6 cables • RJ 45 modular plug • Learning Manuals • Work Instruction • Hand-outs • Board marker • White board • Schematic diagrams • Charts • Block diagrams • Layout plans • Location Plans • Instrumentation diagrams • Loop diagrams • System Control diagrams • Drawing boards

8. TEACHER'S/TRAINER'S QUALIFICATION

Qualification and other requirements for appointment of vocational teachers/trainers on contractual basis should be decided by the State/UT. The suggestive qualifications and minimum competencies for the vocational teacher should be as follows:

S.No.	Qualification	Minimum Competencies	Age Limit
1	Bachelor of Engineering / Technology in Electronics and Communication Engineering. Additionally should have done a Diploma or certificate course in Optical Fiber Communication. The suggested qualification is the minimum criteria. However higher qualifications such as Bachelor of Engineering in Electronics.	The candidate should have a minimum of 1 year of work experience in the same job role. S/He should be able to communicate in English and local language. S/He should have knowledge of equipment, tools, material, Safety, Health & Hygiene.	18-37 years (as on Jan. 01 (year)) Age relaxation to be provided as per Govt. rules

Vocational Teachers/Trainers form the backbone of Vocational Education being imparted as an integral part of Rashtriya Madhyamik Shiksha *Abhiyan* (RMSA). They are directly involved in teaching of vocational subjects and also serve as a link between the industry and the schools for arranging industry visits, On-the-Job Training (OJT) and placement.

These guidelines have been prepared with an aim to help and guide the States in engaging quality Vocational Teachers/Trainers in the schools. Various parameters that need to be looked into while engaging the Vocational Teachers/Trainers are mode and procedure of selection of Vocational Teachers/Trainers, Educational Qualifications, Industry Experience, and Certification/Accreditation.

The State may engage Vocational Teachers/Trainers in schools approved under the component of Vocationalisation of Secondary and Higher Secondary Education under RMSA in following ways:

1. Directly as per the prescribed qualifications and industry experience suggested by the PSS Central Institute of Vocational Education(PSSCIVE), NCERT or the respective Sector Skill Council(SSC). **OR**
2. Through accredited Vocational Training Providers accredited under the National Quality Assurance Framework (NQAF*) approved by the National Skill Qualification Committee on 21.07.2016. If the State is engaging Vocational Teachers/Trainers through the Vocational Training Provider (VTP), it should ensure that VTP should have been accredited at NQAF Level 2 or higher.

   * *The National Quality Assurance Framework (NQAF) provides the benchmarks or quality criteria which the different organisations involved in education and training must meet in order to be accredited by competent bodies to provide government-funded education and training/skills activities. This is applicable to all organizations offering NSQF-compliant qualifications.*

The educational qualifications required for being a Vocational Teacher/Trainer for a particular job role are clearly mentioned in the curriculum for the particular NSQF compliant job role. The State should ensure that teachers / trainers deployed in the schools have relevant technical competencies for the NSQF qualification being delivered. The Vocational Teachers/Trainers preferably should be certified by the concerned Sector Skill Council for the particular Qualification Pack/Job role which he will be teaching. Copies of relevant certificates and/or record of experience of the teacher/trainer in the industry should be kept as record.

To ensure the quality of the Vocational Teachers/Trainers, the State should ensure that a standardized procedure for selection of Vocational Teachers/Trainers is followed. The selection procedure should consist of the following:

1. Written test for the technical/domain specific knowledge related to the sector;
2. Interview for assessing the knowledge, interests and aptitude of trainer through a panel of experts from the field and state representatives; and
3. Practical test/mock test in classroom/workshop/laboratory.

In case of appointment through VTPs, the selection may be done based on the above procedure by a committee having representatives of both the State Government and the VTP.

The State should ensure that the Vocational Teachers/ Trainers who are recruited should undergo induction training of 20 days for understanding the scheme, NSQF framework and Vocational Pedagogy before being deployed in the schools.

The State should ensure that the existing trainers undergo in-service training of 5 days every year to make them aware of the relevant and new techniques/approaches in their sector and understand the latest trends and policy reforms in vocational education.

The Head Master/Principal of the school where the scheme is being implemented should facilitate and ensure that the Vocational Teachers/Trainers:

- Prepare session plans and deliver sessions which have a clear and relevant purpose and which engage the students;
- Deliver education and training activities to students, based on the curriculum to achieve the learning outcomes;
- Make effective use of learning aids and ICT tools during the classroom sessions;
- Engage students in learning activities, which include a mix of different methodologies, such as project based work, team work, practical and simulation based learning experiences;
- Work with the institution's management to organise skill demonstrations, site visits, on-job trainings, and presentations for students in cooperation with industry, enterprises and other workplaces;
- Identify the weaknesses of students and assist them in up-gradation of competency;
- Cater to different learning styles and level of ability of students;
- Assess the learning needs and abilities, when working with students with different abilities
- Identify any additional support the student may need and help to make special arrangements for that support;
- Provide placement assistance

Assessment and evaluation of Vocational Teachers/Trainers is very critical for making them aware of their performance and for suggesting corrective actions. The States/UTs should ensure that the performance of the Vocational Teachers/Trainers is appraised annually. Performance based appraisal in relation to certain pre-established criteria and objectives should be done periodically to ensure the quality of the Vocational Teachers/Trainers. Following parameters may be considered during the appraisal process:

- Participation in guidance and counselling activities conducted at Institutional, District and State level;
- Adoption of innovative teaching and training methods;
- Improvement in result of vocational students of Class X or Class XII;
- Continuous up-gradation of knowledge and skills related to the vocational pedagogy, communication skills and vocational subject;

- Membership of professional society at District, State, Regional, National and International level;
- Development of teaching-learning materials in the subject area;
- Efforts made in developing linkages with the Industry/Establishments;
- Efforts made towards involving the local community in Vocational Education
- Publication of papers in National and International Journals;
- Organisation of activities for promotion of vocational subjects;
- Involvement in placement of students/student support services.

9. LIST OF CONTRIBUTORS

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