



Model Curriculum

QP Name: COVID Frontline Worker (Medical Equipment Support)

QP Code: HSS/Q5604

QP Version: 1.0

NSQF Level: 4

Model Curriculum Version: 1.0

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Training Parameters

Sector	Healthcare
Sub-Sector	Allied Health & Paramedics
Occupation	Non-Direct Care
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3211.0501
Minimum Educational Qualification and Experience	10th standard, who have completed ITI Diploma with 3 years of experience post ITI or Diploma in technical subjects (electronic/mechanical/ electrical/ computers/ any other related field)
Pre-Requisite License or Training	Not Applicable
Minimum Job Entry Age	18 Years
Last Reviewed On	31/05/2021
Next Review Date	31/05/2022
NSQC Approval Date	28/05/2021
QP Version	1.0
Model Curriculum Creation Date	
Model Curriculum Valid Up to Date	31/05/2022
Model Curriculum Version	1.0
Minimum Duration of the Course	888 Hrs.
Maximum Duration of the Course	888 Hrs.

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Explain the role of biomedical department in health care settings.
- Solve basic circuit problems involving DC and AC circuits.
- Describe the theory of operation, functioning and clinical application of medical devices such as Ventilator, BIPAP and CPAP, Oxygen Equipment (Concentrator & Cylinder), Digital Thermometer (IR), Flowmeter, Humidifier, Pulse Oximeter, Multipara Monitor, Nebulizer, BP Instrument, ECG machine and carry out operational checks on such devices.
- Provide training to the hospital staff about operating the various installed medical equipment.
- Demonstrate testing and maintenance of equipment.
- Provide on and off- site assistance with the functioning of the medical equipment.
- Maintain records manually or digitally as per protocols.
- Follow infection control, sanitization, disinfection and bio medical waste protocols.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
HSS/N9622: Follow Sanitization and Infection Control Guidelines NOS Version No. 1.0 NSQF level 3	02:00	06:00	03 Months (72 Days @8 hours/Day)	00:00	888:00
Module 1: Infection control practices and waste management	02:00	06:00		00:00	
HSS/N5607: Understanding the working of basic equipment NOS Version No. 1.0 NSQF level 4	73:00	145:00		00:00	
Module 2: Introduction to the Program	04:00	03:00		00:00	
Module 3: Understanding the working of basic equipment	69:00	142:00		00:00	
HSS/N5608: Calibration and maintenance of basic equipment NOS Version No. 1.0 NSQF level 4	18:00	68:00		00:00	

Module 4: Testing and maintenance of basic equipment	18:00	68:00		00:00	
Total Duration	93:00	219:00	03 Months (72 Days @8 hours/Day)	00:00	888:00

Module Details

Module 1: Infection control practices and waste management Mapped to: HSS/N9622, v1.0

Terminal Outcomes:

- Apply self-hygiene and social distancing practices and follow infection control guidelines.
- Demonstrate correct waste disposal methods as per guidelines and regulations.

Duration: 02:00	Duration: 06:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Discuss the concept of disease outbreak, epidemics, and pandemics and their impact on society at large. • Explain the significance of following prescribed rules and guidelines during an epidemic or a pandemic. • Differentiate between self-quarantine and self-isolation and their significance. • Discuss the significance of social distancing and alternate ways of carrying out everyday tasks (use of e-payment gateways/online learning/virtual meetings, etc.) during a pandemic. • Discuss the significance of conforming to basic personal and workplace hygiene practices such as washing hands, using alcohol-based hand sanitizers, examining office supplies/deliveries and their sanitization, etc. • List various surfaces that may serve as potential fomites at workplace. • Identify PPE to be used at workplace and the process of donning, doffing, and discarding them. • Discuss the importance and process of identifying and reporting symptoms to the concerned authorities. • Discuss organizational hygiene and sanitation guidelines and ways of following them and reporting breaches/gaps if any. • Explain the importance and mechanism of proper and safe disposal, transportation, and treatment of waste. • Discuss the ways of dealing with stress and anxiety during a disease outbreak. 	<ul style="list-style-type: none"> • Show how to sanitize and disinfect one's work area regularly. • Demonstrate the correct way of washing hands using soap and water, and alcohol-based hand rubs. • Display the correct way of donning, doffing and discarding PPE such as face masks, hand gloves, face shields, PPE suits, etc. • Demonstrate appropriate social and behavioural etiquette (greeting and meeting people, spitting/coughing/sneezing, etc.). • Prepare a list of relevant hotline/emergency numbers. • Select different types of waste and various types of colour coded bins/containers used for disposal of waste.
Classroom Aids:	
Computer with internet, Video presentation	
Tools, Equipment and Other Requirements	
E-modules depicting sanitization, infection control and waste disposal practices COVID PPE Kit, Hand Sanitizer, Isopropyl Solution, Different Colour Plastic Bags With Dustbins (Red, Blue, Black, Yellow), Gloves (Disposable) – Packet, Liquid Soap Bottle	

Module 2: Introduction to the Program

Mapped to: HSS/N5607, v1.0

Terminal Outcomes:

- Describe the basic structure and function of healthcare delivery system in India
- Identify the different tools and equipment specific to related job role

Duration: 04:00	Duration: 03:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain about overview of a COVID Frontline Worker (Medical Equipment Support). • Explain about ground rules of working in healthcare industry. • Discuss the code of ethics and therapeutic Communication. • Discuss in brief the healthcare delivery system. • Discuss about the various services offered to patients in a hospital setting. • Explain various departments and their functions in the hospital. • Explain the standard hierarchy of healthcare professionals in a healthcare facility. • Differentiate between the IPD and the OPD. • Explain about COVID specific care facilities, portals, and resources for latest updates about COVID protocols. • List different types of medical instruments and equipment used in the job role of a Medical Equipment Support and the tool kit to be used for its repair and maintenance. • Discuss in brief the basics of cold chain management of COVID vaccine. 	<ul style="list-style-type: none"> • Identify different types of medical instruments and equipment used in the job role of a medical equipment support and the tool kit to be used for its repair and maintenance. • Demonstrate the basic cold chain management methods for COVID vaccine.
Classroom Aids:	
Charts, Models, Video presentation, Flip Chart, White-Board/Smart Board, Marker, Duster, AV Aids for Understanding Human Body Structure and Function	
Tools, Equipment and Other Requirements	
N/A	

Module 3: Understanding the working of basic equipment

Mapped to: HSS/N5607, v1.0

Terminal Outcomes:

- Identify the components of the basic equipment.
- Familiarize with the working of basic equipment.

Duration: 69:00	Duration: 142:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Identify types of cables and connectors. • Identification of surface mounted devices • Identify types of PCB. • Discuss the working knowledge of circuits and spectrum. • Discuss about the working of Regulated DC power supply. • Describe the basic circuits of rectifier, filter, regulator and amplifiers. • Discuss about the standard test procedures to be followed while working with medical equipment and its parts. • Describe the usage and working of equipment and its components: Ventilator, BIPAP and CPAP, Oxygen Equipment (Concentrator & Cylinder), Digital Thermometer (IR), Flowmeter, Humidifier, Pulse Oximeter, Multipara Monitor, Nebulizer, BP Instrument, ECG machine, Spirometer, Suction Apparatus its pipelines and Steam Inhaler. 	<ul style="list-style-type: none"> • Demonstrate testing of diode and transistors. • Demonstrate testing of the components using multi-meter. • Prepare a mini project on troubleshooting of the circuit. • Draw the basic circuits of rectifier, filter, regulator and amplifiers. • Read the data sheets of diode and transistors. • Demonstrate soldering of surface mounted devices. • Demonstrate working of equipment and its components: Ventilator, BIPAP and CPAP, Oxygen Equipment (Concentrator & Cylinder), Digital Thermometer (IR), Flowmeter, Humidifier, Pulse Oximeter, Multipara Monitor, Nebulizer, BP Instrument, ECG machine, Spirometer, Suction Apparatus its pipelines and Steam Inhaler.
Classroom Aids:	
Charts, Models, Video presentation, Flip Chart, White-Board/Smart Board, Marker, Duster, AV Aids for Understanding Human Body Structure and Function	
Tools, Equipment and Other Requirements	
Conductor, Semiconductor, Insulator, Microprocessor, Inductors, Motor, Drilling Machine, Suction apparatus and its pipelines, Connectors, ECG Machine, Humidifiers, Nebulizers, Handheld Digital Thermometer, Temperature sensors, Ventilators, Heart Monitor/Cardiac monitor, Blood pressure monitor, Pulse oximeter, Hand Tools Kit with Multimeter, O2 meter, Watt Meter, Pressure Meters, BIPAP, CPAP, Oxygen Equipment (Concentrator & Cylinder), Flowmeter, Multipara Monitor, Computers/ Laptops	

Module 4: Testing and maintenance of basic equipment

Mapped to: HSS/N5608, v1.0

Terminal Outcomes:

- Develop troubleshooting skills by learning systematic fault-finding techniques, troubleshooting procedures and component replacement procedures.
- Ascertain common problems, operating conditions, precautions & installation procedures of medical equipment and patient safety
- Perform optimum performance tests and routine maintenance of operating modes, front & rear panel controls of different medical equipment.

Duration: 18:00	Duration: 68:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Discuss about the applications of various instruments. • Describe methods of proper handling of instruments • Describe the safety aspects to be followed while testing and maintenance of equipment and its components: Ventilator, BIPAP and CPAP, Oxygen Equipment (Concentrator & Cylinder), Digital Thermometer (IR), Flowmeter, Humidifier, Pulse Oximeter, Multipara Monitor, Nebulizer, BP Instrument, ECG machine, Spirometer, Suction Apparatus its pipelines and Steam Inhaler • Describe various type of documents required during installation, calibration and maintenance as per protocols. 	<ul style="list-style-type: none"> • Measure physical quantities of various materials used during testing and maintenance of equipment accurately. • Demonstrate applications and ways of proper handling of various instruments. • Demonstrate on call assistance by giving assistance to hospital staff regarding the fault • Check graphs/ waveforms for accuracy and correctness. • Read and interpret the graph. • Interpret the results from observations and calculations. • Carry out operational checks, testing, Preventive Maintenance and Troubleshooting of equipment and its components: Ventilator, BIPAP and CPAP, Oxygen Equipment (Concentrator & Cylinder), Digital Thermometer (IR), Flowmeter, Humidifier, Pulse Oximeter, Multipara Monitor, Nebulizer, BP Instrument, ECG machine, Spirometer, Suction Apparatus its pipelines and Steam Inhaler. • Demonstrate documentation procedure of installation, calibration and maintenance with data entry as per protocols.
Classroom Aids:	
Charts, Models, Video presentation, Flip Chart, White-Board/Smart Board, Marker, Duster, AV Aids for Understanding Human Body Structure and Function	
Tools, Equipment and Other Requirements	
Conductor, Semiconductor, Insulator, Microprocessor, Inductors, Motor, Drilling Machine, Suction apparatus and its pipelines, Connectors, ECG Machine, Humidifiers, Nebulizers, Handheld Digital Thermometer, Temperature sensors, Ventilators, Heart Monitor/Cardiac monitor, Blood pressure monitor, Pulse oximeter, Hand Tools Kit with Multimeter, O2 meter, Watt Meter, Pressure Meters, BIPAP, CPAP, Oxygen Equipment (Concentrator & Cylinder), Flowmeter, Multipara Monitor, Computers/ Laptops	

Mandatory Duration: 576:00

Recommended Duration: 00:00

Module Name: On-the-Job Training

Location: On Site

Terminal Outcomes

- Follow covid appropriate behaviour (frequent handwashing and sanitization).
- Orientation to different departments in Hospital
- Learn about COVID specific care facilities, portals and resources for latest updates about COVID protocols
- Identify different types of medical instruments and equipment and its components, circuit, cables, connectors, PCB, etc. and the tool kit to be used for its repair and maintenance
- Orientation to Cold chain management of COVID vaccine
- Clinical use and principle of operation of different types and models : Ventilator, BIPAP and CPAP, Oxygen Equipment (Concentrator & Cylinder), Digital Thermometer (IR), Flowmeter, Humidifier, Pulse Oximeter, Multipara Monitor, Nebulizer, BP Instrument, ECG machine, Spirometer, Suction Apparatus its pipelines and Steam Inhaler
- Hands-on experience in installation, set-up, operation, routine maintenance, internal components and functional verification testing, and demonstration of Cleaning and safety measures, Features and Setup of equipment's and its routine use to hospital staff: Ventilator, BIPAP and CPAP, Oxygen Equipment (Concentrator & Cylinder), Digital Thermometer (IR), Flowmeter, Humidifier, Pulse Oximeter, Multipara Monitor, Nebulizer, BP Instrument, ECG machine, Spirometer, Suction Apparatus its pipelines and Steam Inhaler
- Information to hospital staff about risk factor associated with the use of equipment, complexity involved, manufacturer's instruction and specification and effective use of instruments
- Demonstration of documentation and recording of equipment to hospital staff with data entry as per protocols including reading of instrument/equipment, recording and record maintenance
- Demonstrate handling of biomedical waste from its segregation in different coloured dustbin as per the protocol.
- Demonstrate spillage management with 1% hypochlorite solution.
- Demonstrate donning and doffing off PPE.

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Graduate	Bio-medical Engineer or Biomedical Instrumentation or Electronic/Mechanical Engineering	2 years	Relevant experience in hospital Biomedical or Clinical Engineering Department or hospital-based Independent Service Organization			
Diploma	Bio-medical Engineer or Biomedical Instrumentation or Electronic/Mechanical Engineering	5 years	Relevant experience in hospital Biomedical or Clinical Engineering Department or hospital-based Independent Service Organization			

Trainer Certification	
Domain Certification	Platform Certification
Certified for Job Role: "COVID Frontline Worker (Medical Equipment Support)" mapped to QP: "HSS/Q5604 v1.0" with minimum score of 80%.	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q2601" with minimum score of 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
Graduate	Bio-medical Engineer or Biomedical Instrumentation or Electronic/Mechanical Engineering	2 years	Relevant experience in hospital Biomedical or Clinical Engineering Department or hospital-based Independent Service Organization			
Diploma	Bio-medical Engineer or Biomedical Instrumentation or Electronic/Mechanical Engineering	5 years	Relevant experience in hospital Biomedical or Clinical Engineering Department or hospital-based Independent Service Organization			

Assessor Certification	
Domain Certification	Platform Certification
Certified for Job Role: "COVID Frontline Worker (Medical Equipment Support)" mapped to QP: "HSS/Q5604 v1.0" with minimum score of 80%.	Recommended that the Assessor is certified for the Job Role: "Assessor", mapped to the Qualification Pack: "MEP/Q2701" with minimum score of 80%.

Assessment Strategy

The emphasis is on 'learning-by-doing' and practical demonstration of skills and knowledge based on the performance criteria. Accordingly, assessment criteria for each job role is set and made available in qualification pack.

The assessment papers for both theory and practical would be developed by Subject Matter Experts (SME) hired by Healthcare Sector Skill Council or with the HSSC accredited Assessment Agency as per the assessment criteria mentioned in the Qualification Pack. The assessments papers would also be checked for the various outcome-based parameters such as quality, time taken, precision, tools & equipment requirement etc.

Each NOS in the Qualification Pack (QP) is assigned a relative weightage for assessment based on the criticality of the NOS. Therein each Element/Performance Criteria in the NOS is assigned marks on relative importance, criticality of function and training infrastructure.

The On the Job (OJT) training component, which is a mandatory part of the training, done by the candidate at a healthcare organization has to be appropriately captured as per OJT log book framework. This shall be assessed and would carry the weightage during final assessment done by HSSC as per assessment strategy defined for COVID Frontline Worker (Medical Equipment Support).

The following tools would be used for final assessment:

1. Practical Assessment: This comprises of a creation of mock environment in the skill lab which is equipped with all equipment required for the qualification pack.

Candidate's soft skills, communication, aptitude, safety consciousness, quality consciousness etc. is ascertained by observation and marked in observation checklist. The outcome is measured against the specified dimensions and standards to gauge the level of their skill achievements.

2. Viva/Structured Interview: This tool is used to assess the conceptual understanding and the behavioral aspects with regard to the job role and the specific task at hand. It also includes questions on safety, quality, environment and equipment etc.

3. Written Test: Question paper consisting of 100 MCQs (Hard:40, Medium:30 and Easy: 30) with questions from each element of each NOS. The written assessment paper is comprised of following types of questions:

- i. True / False Statements
- ii. Multiple Choice Questions
- iii. Matching Type Questions.
- iv. Fill in the blanks
- v. Scenario based Questions
- vi. Identification Questions

QA Regarding Assessors:

Assessors are selected as per the "eligibility criteria" laid down by HSSC for assessing each job role. The assessors selected by Assessment Agencies are scrutinized and made to undergo training and introduction to HSSC Assessment Framework, competency based assessments, assessors guide etc. HSSC conducts "Training of Assessors" program from time to time for each job role and sensitize assessors regarding assessment process and strategy which is outlined on following mandatory parameters:

- 1) Guidance regarding NSQF
- 2) Qualification Pack Structure
- 3) Guidance for the assessor to conduct theory, practical and viva assessments
- 4) Guidance for trainees to be given by assessor before the start of the assessments.
- 5) Guidance on assessments process, practical brief with steps of operations practical observation checklist and mark sheet
- 6) Viva guidance for uniformity and consistency across the batch.
- 7) Mock assessments
- 8) Sample question paper and practical demonstration

References

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.

Acronyms and Abbreviations

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
CPR	Cardio Pulmonary Resuscitation