





COVID Frontline Worker (Medical Equipment Support)

QP Code: HSS/Q5604

Version: 1.0

NSQF Level: 4

Healthcare Sector Skill Council || Healthcare Sector Skill Council,520, DLF Tower A, 5th Floor, Jasola District Centre

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HSS/Q5604: COVID Frontline Worker (Medical Equipment Support)

Brief Job Description

Individuals on this job require to use various medical equipment needed during COVID management such as Ventilator, BIPAP and CPAP, Oxygen Equipment (Concentrator & Cylinder), Digital Thermometer (IR), Flowmeter, Humidifier, Pulse Oximeter, Multipara Monitor, Nebulizer, BP Instrument, ECG machine, steam inhaler, suction apparatus and its pipelines. They are also responsible for repair and maintenance of the equipment using hand tools as well as computer applications. Besides reviewing product manuals, the person is also involved in maintaining records manually and digitally.

Personal Attributes

They should have a passion for machines and technology as well as a knack for troubleshooting and repairs. Because an equipment failure often creates an emergency situation, the assistant must work well in fast-paced, high-pressure situations. Finally, he/she must have excellent interpersonal skills in order to work effectively with medical professionals, hospital staff, administrators, patients and instruments.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

- 1. HSS/N5607: Understanding the working of basic equipment
- 2. HSS/N5608: Calibration and maintenance of basic equipment
- 3. HSS/N9622: Follow sanitization and infection control guidelines

Qualification Pack (QP) 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 & Experience	10th Class + I.T.I with 3-5 Years of experience OR Diploma (technical subjects like electronic/mechanical/ electrical/ computers/ any other related field)
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	Not Applicable
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	NA
NSQC Approval Date	
Version	1.0

Remarks:

This is a crash course designed to skill individuals for medical equipment repair and maintenance support during COVID pandemic by selecting required NOS from Medical Equipment Technology Assistant, HSS/Q5602 Version 1.0 QP. After completion of this crash course, the individual will not be equivalent to a certified Medical Equipment Technology Assistant.





HSS/N5607: Understanding the working of basic equipment

Description

This unit provides knowledge & understanding about functioning of basic medical equipment. This NOS has been derived from the module, Understanding the working of basic equipment of the Short Term Training Curriculum: Medical Equipment Technology Assistant prepared by MOHFW.

Scope

The scope covers the following:

- Electronic circuit
- Electronic component and application
- Biomedical instrumentation and measurement
- Familiarization and working with Ultrasound machine, ECG and x-ray equipments

Elements and Performance Criteria

Electronic circuit

To be competent, the user/individual on the job must be able to:

- PC1. working knowledge and hands on experience with designing of circuits
- **PC2.** mini project and troubleshooting of the circuit
- **PC3.** draw and describe the basic circuits of rectifier, filter, regulator and amplifiers
- PC4. able to draw circuits
- **PC5.** understand working of regulated DC power supply
- **PC6.** ability to test the components using multimeter

Electronic component and application

To be competent, the user/individual on the job must be able to:

- **PC7.** working knowledge of spectrum
- **PC8.** identify types of cables and connectors
- **PC9.** to study design rules for fabrication of PCB and identify types of PCB
- PC10. read the data sheets of diode and transistors
- PC11. test diode and transistors

Biomedical instrumentation and measurement

To be competent, the user/individual on the job must be able to:

- **PC12.** identification and soldering of surface mounted devices
- **PC13.** follow standard test procedures

Familiarization and working with Ultrasound machine, ECG and x-ray equipments

To be competent, the user/individual on the job must be able to:

- **PC14.** have understanding related to medical exposure of x-rays
- **PC15.** familiarizing and working with components eg: USG machines, ECG machines, X-ray equipment etc.

Knowledge and Understanding (KU)

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Oualification Pack



The individual on the job needs to know and understand:

- **KU1.** how to test various medical devices for proper operation
- **KU2.** the healthcare technology management
- KU3. computerized equipment control and record keeping
- **KU4.** safety issues will be covered in relation to both patient safety and the safety of biomedical equipment technology assistants (BMEAs)
- **KU5.** basic theory of operation, function, clinical application and operation testing of a range of medical devices
- **KU6.** linear circuit analysis and design
- **KU7.** theory and operation of diodes and bipolar and field-effect transistors with circuit analysis
- **KU8.** laboratory includes the design and evaluation of bipolar and FET linear circuits using the oscilloscope and curve tracer
- **KU9.** introduction of integrated circuits
- **KU10.** inductors and cable connectors- ferrimagnetic, B-H curve, Hard & soft Magnetic Materials, Concepts of Hysteresis, permeability, coercivity, reluctivity, Losses of magnetic material, Faradays laws of Electromagnetic Induction, Self &mutual induced EMF Inductor Specifications- Definitions and expressions of self-inductance, mutual inductance, coefficient of coupling, operation at low & high frequency, Q factor, Inductive Reactance; Construction and application of Air core, iron core, ferrite core inductor, and frequency range Inductors-A.F. R.F., I.F., toroidal Inductor, Construction, working, application of Slug tuned Inductor
- **KU11.** color coding of inductor using color band system
- **KU12.** connectors- general specifications of connectors- contact resistance, breakdown voltage, insulation resistance, constructional diagram, applications of BNC, D series, Audio, Video, printer, edge, FRC, RJ 45 connectors; Constructional diagram and applications of Phone Plug & lacks
- **KU13.** basics of mechanical foundry equipments
- **KU14.** working of motor, drilling
- **KU15.** basic concept of suction apparatus
- KU16. review of combinational & sequential logic circuits
- **KU17.** data converters
- **KU18.** semiconductor memories
- **KU19.** microprocessor
- **KU20.** medical exposure of x-rays
- **KU21.** medical computer usage and applications in imaging field
- **KU22.** basic of active and passive components
- KU23. types of components with its working

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1. maintain code of conduct, professional accountability and responsibility
- **GS2.** observe ethical practices
- **GS3.** maintain confidentiality and seek consent when appropriate





- **GS4.** gather information from observation, experience, and reasoning
- **GS5.** maintain appropriate body language
- **GS6.** undertake formal & informal writing for inter- and intra-department communication including documentation and report writing
- **GS7.** read and interpret internal communications correctly
- GS8. structure brief and logical messages
- **GS9.** speak clearly and slowly in a gentle tone
- **GS10.** maintain effective communication with patients, family, peers and colleagues using medical terminology
- **GS11.** handle queries and objections
- **GS12.** show telephone and email etiquettes
- **GS13.** plan and organize work appropriately to meet requirements
- GS14. use time management skills
- **GS15.** prioritise and manage work
- GS16. use language familiar to the listener
- **GS17.** give facts and avoid opinions unless asked for
- **GS18.** set goals and timelines with clearly defined key performance indicators and communicate them effectively to all relevant persons
- **GS19.** keep stakeholders informed about progress
- **GS20.** build customer relationships and use customer-centric approach
- **GS21.** address work-related issues and problems
- **GS22.** perceive the impact and implications of decisions
- GS23. analyze information and use logic to address work-related issues and problems
- **GS24.** be adaptive to rapidly changing situations, e.g.: respond appropriately to critical situations, retain composure in stressful situations, apply existing skills to new situations





Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Electronic circuit	30	80	-	-
PC1. working knowledge and hands on experience with designing of circuits	10	20	-	-
PC2. mini project and troubleshooting of the circuit	-	20	-	-
PC3. draw and describe the basic circuits of rectifier, filter, regulator and amplifiers	10	20	-	-
PC4. able to draw circuits	-	10	-	-
PC5. understand working of regulated DC power supply	10	-	-	-
PC6. ability to test the components using multimeter	-	10	-	-
Electronic component and application	40	50	-	-
PC7. working knowledge of spectrum	10	10	-	-
PC8. identify types of cables and connectors	10	10	-	-
PC9. to study design rules for fabrication of PCB and identify types of PCB	10	10	-	-
PC10. read the data sheets of diode and transistors	10	10	-	-
PC11. test diode and transistors	-	10	-	-
Biomedical instrumentation and measurement	10	20	-	-
PC12. identification and soldering of surface mounted devices	-	10	-	-
PC13. follow standard test procedures	10	10	-	-
Familiarization and working with Ultrasound machine, ECG and x-ray equipments	20	40	-	-
PC14. have understanding related to medical exposure of x-rays	10	10	-	-





Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC15. familiarizing and working with components eg: USG machines, ECG machines, X-ray equipment etc.	10	30	-	-
NOS Total	100	190	-	-





National Occupational Standards (NOS) Parameters

NOS Code	HSS/N5607
NOS Name	Understanding the working of basic equipment
Sector	Healthcare
Sub-Sector	Allied Health & Paramedics
Occupation	Non-Direct Care
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	NA
Next Review Date	18/12/2021
NSQC Clearance Date	





HSS/N5608: Calibration and maintenance of basic equipment

Description

This unit provides knowledge & understanding about calibration and maintenance of basic medical equipment. This NOS has been derived from the module, calibration and maintenance of basic equipment of the Short Term Training Curriculum: Medical Equipment Technology Assistant prepared by MOHFW.

Scope

The scope covers the following:

- Electronic circuit
- Safety procedural guidelines
- Installation, Maintenance and Servicing of Medical Equipment

Elements and Performance Criteria

Electronic circuit

To be competent, the user/individual on the job must be able to:

- **PC1.** mini project and troubleshooting of the circuit
- **PC2.** measuring physical quantities accurately
- **PC3.** check graphs/ waveforms for accuracy and correctness
- **PC4.** read and interpret the graph
- **PC5.** interpreting the results from observations and calculations

Safety procedural guidelines

To be competent, the user/individual on the job must be able to:

- **PC6.** awareness of the safety aspects of medical instruments
- **PC7.** to adopt proper procedure while performing the experiment

Installation, Maintenance and Servicing of Medical Equipment

To be competent, the user/individual on the job must be able to:

- PC8. demonstrate on call assistance by giving assistance to hospital staff regarding the fault
- **PC9.** applications of various instruments
- **PC10.** proper handling of instruments
- PC11. know installation procedure
- PC12. information search through internet

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- **KU1.** it includes lecture series in continuation of solid-state linear circuit analysis and design
- **KU2.** design details of cascade resistance and direct coupled amplifiers
- **KU3.** integrated differential and operational amplifiers
- **KU4.** power amplifiers and oscillators

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Oualification Pack



- **KU5.** introduction to feedback and distortion
- **KU6.** laboratory sessions to practice in fabricating, troubleshooting and testing solid-state linear circuits using the oscilloscope, generators and the distortion analyzer
- **KU7.** precautions while handling the radioactive rays
- **KU8.** precautions while handling the high voltage circuits
- **KU9.** securing the equipment and surroundings while repairing the equipment son the spot
- KU10. shock and vibrations
- **KU11.** protection from electro-magnetic interference
- **KU12.** maintaining the safety of the patient in the vicinity
- **KU13.** introduction & fundamental of trouble shooting
- **KU14.** installation procedure for equipment
- **KU15.** performance test & calibration of medical equipment
- KU16. trouble shooting & fault-finding procedure of medical equipment
- **KU17.** safety instrumentation
- KU18. provide on call and on-site assistance
- **KU19.** maintenance and coding of various types of the logbook for the machines in various departments of the hospital

Generic Skills (GS)

User/individual on the job needs to know how to:

- **GS1.** maintain code of conduct, professional accountability and responsibility
- **GS2.** observe ethical practices
- **GS3.** maintain confidentiality and seek consent when appropriate
- GS4. gather information from observation, experience, and reasoning
- GS5. maintain appropriate body language
- **GS6.** undertake formal & informal writing for inter- and intra-department communication including documentation and report writing
- **GS7.** read and interpret internal communications correctly
- GS8. structure brief and logical messages
- **GS9.** speak clearly and slowly in a gentle tone
- **GS10.** maintain effective communication with patients, family, peers and colleagues using medical terminology
- **GS11.** handle queries and objections
- **GS12.** show telephone and email etiquettes
- **GS13.** plan and organize work appropriately to meet requirements
- **GS14.** use time management skills
- **GS15.** prioritise and manage work
- **GS16.** use language familiar to the listener
- GS17. give facts and avoid opinions unless asked for
- **GS18.** set goals and timelines with clearly defined key performance indicators and communicate them effectively to all relevant persons





- **GS19.** keep stakeholders informed about progress
- **GS20.** build customer relationships and use customer-centric approach
- **GS21.** address work-related issues and problems
- **GS22.** perceive the impact and implications of decisions
- GS23. analyze information and use logic to address work-related issues and problems
- **GS24.** be adaptive to rapidly changing situations, e.g.: respond appropriately to critical situations, retain composure in stressful situations, apply existing skills to new situations





Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Electronic circuit	30	70	-	-
PC1. mini project and troubleshooting of the circuit	10	30	-	-
PC2. measuring physical quantities accurately	-	10	-	-
PC3. check graphs/ waveforms for accuracy and correctness	10	10	-	-
PC4. read and interpret the graph	10	10	-	-
PC5. interpreting the results from observations and calculations	-	10	-	-
Safety procedural guidelines	20	10	-	-
PC6. awareness of the safety aspects of medical instruments	10	-	-	-
PC7. to adopt proper procedure while performing the experiment	10	10	-	-
Installation, Maintenance and Servicing of Medical Equipment	20	50	-	-
PC8. demonstrate on call assistance by giving assistance to hospital staff regarding the fault	-	10	-	-
PC9. applications of various instruments	10	10	-	-
PC10. proper handling of instruments	-	10	-	-
PC11. know installation procedure	10	10	-	-
PC12. information search through internet	-	10	-	-
NOS Total	70	130	-	-





National Occupational Standards (NOS) Parameters

NOS Code	HSS/N5608
NOS Name	Calibration and maintenance of basic equipment
Sector	Healthcare
Sub-Sector	Allied Health & Paramedics
Occupation	Non-Direct Care
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	NA
Next Review Date	18/12/2021
NSQC Clearance Date	





HSS/N9622: Follow sanitization and infection control guidelines

Description

This OS unit is about following ways for sanitization to prevent the spread of infection as per sectoral working requirements.

Scope

The scope covers the following:

- Social distancing practices
- Personal and workplace hygiene
- Waste disposal methods
- Reporting and information gathering
- Mental and emotional wellbeing

Elements and Performance Criteria

Social distancing practices

To be competent, the user/individual on the job must be able to:

- **PC1.** maintain appropriate social distance as per specified protocols, for example, while greeting people, when in crowded places, using contactless mode of delivery of goods, etc.
- **PC2.** carry out daily tasks using alternate methods e.g. virtual meetings, e-payments, etc.

Personal and workplace hygiene

To be competent, the user/individual on the job must be able to:

- **PC3.** follow recommended personal hygiene and sanitation practices, for example, washing/sanitizing hands, covering face with a bent elbow while coughing/sneezing, using PPE. etc.
- **PC4.** follow recommended workplace hygiene and sanitation practices, for example, sanitizing workstation and equipment regularly, using disposable wipes and utensils, using alternative systems to mark attendance, etc.
- **PC5.** clean and disinfect all materials/supplies before and after use.

Waste disposal methods

To be competent, the user/individual on the job must be able to:

- **PC6.** segregate waste as per guidelines
- **PC7.** dispose waste as per guidelines

Reporting and information gathering

To be competent, the user/individual on the job must be able to:

- **PC8.** keep abreast of the latest information and guidelines from reliable sources.
- **PC9.** report signs and symptoms related to illness of self and others immediately to appropriate authority

Mental and emotional wellbeing

To be competent, the user/individual on the job must be able to:

PC10. seek help and guidance in case of stress and anxiety





Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. solid waste management Rules 2016
- KU2. significance of personal hygiene practice including hand hygiene
- **KU3.** social distancing norms
- **KU4.** correct method of donning and doffing of PPE
- **KU5.** significance of appropriate waste disposal methods and organizational and national waste management principles and procedures
- **KU6.** ways to handle waste appropriately to reduce the risk of contamination
- **KU7.** the logistics of waste management
- KU8. the current national legislation, guidelines, local policies, and protocols related to work
- **KU9.** ways to manage infectious risks in the workplace
- KU10. the path of disease transmission
- KU11. different methods of cleaning, disinfection, sterilization, and sanitization
- **KU12.** the types of cleaning agents
- **KU13.** symptoms of infections like fever, cough, redness, swelling and inflammation
- **KU14.** signs of stress and anxiety

Generic Skills (GS)

User/individual on the job needs to know how to:

- **GS1.** write formal and informal letters/emails, memos, reports, etc
- **GS2.** read and interpret internal communications correctly
- **GS3.** communicate the information effectively during interactions
- **GS4.** analyze situations and make appropriate decisions
- **GS5.** prioritize, organize, and accomplish work within prescribed timelines





Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Social distancing practices	5	3	-	-
PC1. maintain appropriate social distance as per specified protocols, for example, while greeting people, when in crowded places, using contactless mode of delivery of goods, etc.	-	-	-	-
PC2. carry out daily tasks using alternate methods e.g. virtual meetings, e-payments, etc.	-	-	-	-
Personal and workplace hygiene	4	4	-	-
PC3. follow recommended personal hygiene and sanitation practices, for example, washing/sanitizing hands, covering face with a bent elbow while coughing/sneezing, using PPE, etc.	-	-	-	-
PC4. follow recommended workplace hygiene and sanitation practices, for example, sanitizing workstation and equipment regularly, using disposable wipes and utensils, using alternative systems to mark attendance, etc.	-	-	-	-
PC5. clean and disinfect all materials/supplies before and after use.	-	-	-	-
Waste disposal methods	3	2	-	-
PC6. segregate waste as per guidelines	-	-	-	-
PC7. dispose waste as per guidelines	-	-	-	-
Reporting and information gathering	3	2	-	-
PC8. keep abreast of the latest information and guidelines from reliable sources.	-	-	-	-
PC9. report signs and symptoms related to illness of self and others immediately to appropriate authority	-	-	-	-
Mental and emotional wellbeing	2	2	-	-
PC10. seek help and guidance in case of stress and anxiety	-	-	-	-





Assessment Criteria for Outcomes	Theory	Practical	Project	Viva
	Marks	Marks	Marks	Marks
NOS Total	17	13	-	-





National Occupational Standards (NOS) Parameters

NOS Code	HSS/N9622
NOS Name	Follow sanitization and infection control guidelines
Sector	Healthcare
Sub-Sector	Generic
Occupation	Generic
NSQF Level	3
Credits	TBD
Version	1.0
Last Reviewed Date	NA
Next Review Date	NA
NSQC Clearance Date	

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

- 1. The QP and hence the assessment criteria have been derived from the curriculum of Ministry of Health and Family Welfare (MoHFW)
- 2. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS.
- 3. The assessment for the theory part will be based on the knowledge bank of questions created by the SSC.
- 4. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
- 5. Individual assessment agencies will create unique question papers for the theory part for each candidate at each examination/training center (as per assessment criteria below).
- 6. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.
- 7. To pass the Qualification Pack assessment, every trainee should score a minimum of 70% of % aggregate marks to successfully clear the assessment.





8. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Minimum Aggregate Passing % at QP Level: 70

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
HSS/N5607.Understanding the working of basic equipment	100	190	0	0	290	40
HSS/N5608.Calibration and maintenance of basic equipment	70	130	0	0	200	40
HSS/N9622.Follow sanitization and infection control guidelines	17	13	-	-	30	20
Total	187	333	-	-	520	100





Acronyms

NOS	National Occupational Standard(s)	
NSQF	National Skills Qualifications Framework	
QP	Qualifications Pack	
TVET	Technical and Vocational Education and Training	





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.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
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.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.
Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.





Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.