# JOB SPECIFICATON

# AND

# SKILL TEST

**JOB TITLE** : **Micro Hydro Operator, L-2**

**SECTOR** : **Energy**

**SUB-SECTOR** : **Micro Hydropower (MHP) Plant**
**(Micro Hydro with electrification)**

COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING

## NATIONAL SKILL TESTING BOARD

**MADHYAPUR THIMI -17, SANOTHIMI, BHAKTAPUR, NEPAL**

**July 1999(2056)**

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**Approved by Tripartite National Skill Testing Board 1999**

**(Sponsored by: Centre for Renewable Energy (CRE), Bag Bazar, Kathmandu**

## JOB SPECIFICATION

| | |
|---|---|
| **1** | **JOB TITLE : Micro Hydro Operator**<br>**LEVEL : Two** |
| **2** | **JOB DESCRIPTION:**<br>Carries-out daily inspection and preventive maintenance work. Checks and maintains components of MHP plant. Operates the plant smoothly. Keeps record of the basic tool-kit, spare parts. Keeps inventory of basic necessary things such as oil, grease etc. Maintains the logbook. Installs, repairs electrical wiring within the powerhouse (if necessary), and reports. |
| **3** | **LIST OF TASKS:**<br>1. Checking of related component of MHP plant-Civil<br>2. Checking of related component of MHP plant-Mechanical<br>3. Checking of related component of MHP plant-Electrical<br>4. Starting of MHP plant.<br>5. Checking relevant parameters/performances of MHP before load dispatch.<br>6. Checking and maintaining of parameters after dispatching load.<br>7. Normal shutting down of MHP plant.<br>8. Emergency shutting down of MHP plant.<br>9. Installing electrical wiring of powerhouse.<br>10. Checking and maintaining logbook.<br><br>***NOTE: - Follow Code of Practice or manufacture's data until and unless mentioned in the task/standard.**<br>**This standard does not cover a) agro processing unit**<br>**b) transformer**<br>**c) Electronic Load Controller (ELC) with extension load.** |
| **4** | **QUALIFYING NOTES (entry requirement etc.)**<br>- Physical requirement : Normal health<br>- Educational requirement : Literate and able to understand general specification/as per CTEVT rules/regulation. |

| TASK SPECIFICATION | |
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| **5** | **TASK NO: 1**<br>**Checking of related component of MHP plant-Civil** **JOB TITTLE: Micro Hydro Operator, L-2** |
| **6** | **TASK ELEMENTS:**<br>1.1 Checks for debris at trash racks, intake, headrace, desilting basin and forebay.<br>1.2 Checks leakage through structures, expansion joints and valves.<br>1.3 Checks water level at forebay and desilting basin.<br>1.4 Flushes desilting basin/forebay if necessary. |

| | TASK SPECIFICATION |
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| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Shovel Pick and bucket. |
| **8** | **TASK PERFORMANCE STANDARDS:**<br>➢ Debris cleaned at trash racks, intake, headrace, desilting basin and forebay.<br>➢ Leakage checked through structures, expansion joints and valves.<br>➢ While operating the valves, unusual sound and tightness checked.<br>➢ Mark of water level at forebay and desilting basin checked.<br>➢ Sediment at desilting basin/forebay checked visually and flushed (if necessary). |

| 9 | 10 | TASK TRAINING DATA | | | |
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| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **1** | 1.1<br><br>1.2<br>1.3 | Knows name and function of intake, desilting basin, trash rack, headrace, sluice gate, spillway, forebay, penstock and valves.<br>Knows the application of oil, grease and its type.<br>Knows required minimum water level at forebay. | Able to take linear measurements. | | Safe uses of shovel pick. |

| | TASK PERFORMANCE TEST (SKILL ASSESSMENT) | | |
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| **11** | **TASK TITLE : Checking of related component of MHP plnat-Civil**<br><br>**TASK NO : 1** | | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |
| **12** | **TEST FACTORS AND ITEMS** | **STANDARD MET** | **STANDARD NOT MET (Comments)** |
| | **DID THE CANDIDATE ?**<br>1.1 Clean debris at trash racks, intake, headrace, desilting basin and forebay.<br>1.2 Check leakage through structures, penstock and valves.<br>1.3 Check the mark of water level at forebay and desilting basin.<br>1.4 Check and flush out sediment in desilting basin/forebay. | | |

| TASK SPECIFICATION | |
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| **5** | **TASK NO: 2**<br>**Checking of related component of MHP plant-Mechanical** **JOB TITTLE: Micro Hydro Operator, L-2** |
| **6** | **TASK ELEMENTS:**<br>2.1 Checks proper tightness of nuts, bolts on the foundation/base frame of power plant and penstock.<br>2.2 Checks forebay valve, penstock valve (sluice valve) and turbine valve for proper lubrication and smooth operation.<br>3.3 Checks mechanical transmission system (coupling or drive belt) for proper tightness, alignment and condition. |

| | TASK SPECIFICATION |
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| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Spanner, slide wrench, hammer, oil, grease, measuring tape. |
| **8** | **TASK PERFORMANCE STANDARDS:**<br>➢ Nuts, bolts on the foundation/base frame of power plant and penstock properly checked and tightened.<br>➢ While operating the valves, any unusual sound and tightness checked.<br>➢ Vibration and sound in mechanical transmission system checked for any abnormality.<br>➢ Belt tension and condition checked for abnormality. |

| 9 | 10 | TASK TRAINING DATA | | | |
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| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **2** | 2.1<br>2.2<br>2.3 | Knows the application of oil, grease and its type.<br>Knows different kinds of valves and its application.<br>Knows the effect of belt tension. | | | • Safe use of handling tools.<br>• Proper use of lubricants/grease. |

| | TASK PERFORMANCE TEST (SKILL ASSESSMENT) | | |
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| **11** | **TASK TITLE : Checking of related component of MHP plant-Mechanical**<br><br>**TASK NO : 2** | | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |
| **12** | **TEST FACTORS AND ITEMS** | **STANDARD MET** | **STANDARD NOT MET (Comments)** |
| | **DID THE CANDIDATE ?**<br>2.1 Check/tighten nuts, bolts on the foundation/base frame of power plant.<br>2.2 Check the valves.<br>2.3 Check tightness, alignment and condition of mechanical transmission system. | | |

| | TASK SPECIFICATION |
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| **5** | **TASK NO: 3**<br>**Checking of related component of MHP plant-Electrical** **JOB TITTLE: Micro Hydro Operator, L-2** |
| **6** | **TASK ELEMENTS:**<br>3.1 Checks electrical condition inside power house.<br>2.2 Checks blown fuses/MCB/MCCB.<br>3.3 Checks transmission and distribution system (condition of poles, conductors and insulators) visually for any abnormality. |

| | TASK SPECIFICATION |
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| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Multimeter, basic toolbox having screwdrivers, wire stripper, side cutter, hacksaw. |
| **8** | **TASK PERFORMANCE STANDARDS:**<br>➢ Electrical condition inside the powerhouse visually checked and tested with multimeter (if necessary).<br>➢ Continuity checked for HRC fuses.<br>➢ MCBs/MCCB visually checked and switched placed in ON position.<br>➢ Transmission and distribution system (condition of poles, conductors, insulators) visually inspected for any abnormality. |

| 9 | 10 | TASK TRAINING DATA | | | |
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| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **3** | 3.1<br><br>3.2<br><br><br>3.3<br><br><br>3.4 | Knows basic electricity<br>Current (AC/DC), voltage, resistance, power, and frequency.<br>Knows electrical circuits.<br>Series/parallel circuits.<br>Open, close, short and earth leakage circuits.<br>Knows the protective system.<br>System earthing, appliance earthing, lightening arrestor, fuses, MCB, MCCB.<br>Knows name and function of conductors, insulators, stay set, pole. | | | Safe use of handling tools.<br>Importance of electrical safety.<br>Hazards of electrical shock.<br>Perform first aid and report. |

| | TASK PERFORMANCE TEST (SKILL ASSESSMENT) | | |
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| **11** | **TASK TITLE : Checking of related component of MHP plant-Electrical**<br><br>**TASK NO : 3** | | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |
| **12** | **TEST FACTORS AND ITEMS** | **STANDARD MET** | **STANDARD NOT MET (Comments)** |
| | **DID THE CANDIDATE ?**<br>3.1 Inspect electrical condition inside the powerhouse.<br>3.2 Inspect fuses.<br>3.3 Inspect transmission and distribution system (condition of poles, conductors and insulators) visually for any abnormality. | | |

## TASK SPECIFICATION

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| **5** | **TASK NO: 4**<br>**Starting of MHP plant for the generation of electrical power.** **JOB TITTLE: Micro Hydro Operator, L-2** |
| **6** | **TASK ELEMENTS:**<br>4.1 Ensures that the users know starting time of power plant.<br>4.2 Checks main switch on the load side is in OFF position.<br>4.3 Checks water level in ballast tank.<br>4.4 Checks heating element of ballast.<br>4.5 Checks mechanical transmission system (coupling or belt drive).<br>4.6 Ascertains whether the penstock is full of water or empty.<br>4.7 Opens the penstock valve gradually to allow the water to flow into turbine.<br>4.8 Checks pressure gauge while allowing the water in the turbine.<br>4.9 Regulates the water flow by opening the turbine valves until the voltage, frequency and power output come up to the desirable level.<br>4.10 Switches ON main MCB of generator.<br>4.11 Switches the main load switch to ON position.<br>4.12 Starts maintaining log book. |

| | TASK SPECIFICATION |
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| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Logbook |
| **8** | **TASK PERFORMANCE STANDARDS:**<br>➢ Ensured that users are informed the starting time of power plant.<br>➢ Main load switch put to OFF position.<br>➢ Heating element completely emerged in water of ballast tank.<br>➢ Resistance of heating element checked by multimeter.<br>➢ Vibration and abnormal sound checked.<br>➢ Belt tension and condition visually checked for abnormality.<br>➢ Penstock valve opened gradually.<br>➢ Pressure gauge reading checked (Specified value found)<br>➢ Regulated the water flow by opening the turbine valves until the voltage, frequency come up to the desirable level.<br>➢ Main MCB of generator kept in ON position.<br>➢ Main load switch kept in ON position.<br>➢ Logbook maintained. |

| 9 | 10 | TASK TRAINING DATA | | | |
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| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **4** | 4.1 | Knows application of load controller.<br>• Electronic Load Controller (ELC)<br>• Induction Generator Controller (IGC) | | | |
| | 4.2 | Knows mechanical transmission system.<br>• Coupling, drive belt. | | | |
| | 4.3 | Knows head and discharge. | | | |
| | 4.4 | Knows different types of valves and its application. | | | |
| | 4.5 | Knows specific value of pressure gauge. | | | |
| | 4.6 | Knows electrical parameters (voltage, current, and frequency). | | | |
| | 4.7 | Knows megger test. | | | |
| | 4.8 | Knows logbook and its application. | | | |

| | TASK PERFORMANCE TEST (SKILL ASSESSMENT) | | |
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| **11** | **TASK TITLE : Starting of MHP plant for the generation of electrical power.**<br><br>**TASK NO : 4** | | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |
| **12** | **TEST FACTORS AND ITEMS** | **STANDARD MET** | **STANDARD NOT MET (Comments)** |
| | **DID THE CANDIDATE ?**<br>4.1 Ensure the users know the starting time of power plant.<br>4.2 Put OFF main load switch.<br>4.3 Check water level in ballast tank<br>4.4 Check the heating element of ballast.<br>4.5 Check mechanical transmission system (coupling or drive belt).<br>4.6 Ascertain whether the penstock is full of water or empty.<br>4.7 Open the penstock valve gradually to allow the water to flow into turbine.<br>4.8 Check pressure gauge while allowing the water in the turbine.<br>4.9 Regulate the water flow by opening the turbine valves until the voltage, frequency and power output come up to the desirable level.<br>4.10 Switch ON main MCB of generator.<br>4.11 Switch the main load switch to ON position.<br>4.12 Start maintaining logbook. | | |

| TASK SPECIFICATION | |
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| **5** | **TASK NO: 5**<br>**Checking relevant parameters/performances of MHP before load dispatch.** **JOB TITTLE: Micro Hydro Operator, L - 2** |
| **6** | **TASK ELEMENTS:**<br>5.1 Checks the voltage and frequency (before switching the main switch ON).<br>5.2 Checks for any abnormal noises.<br>5.3 Checks temperature of the bearing and generator. |

| | TASK SPECIFICATION |
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| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Multimeter |
| **8** | **TASK PERFORMANCE STANDARDS:**<br>➢ Voltage, frequency kept in desired position (preset value) with tolerance of ± 2.5% for voltage and ± 3% for frequency.<br>➢ Abnormal sound checked.<br>➢ Bearing and generator temperature judged as appropriate or hot by feeling with hand. |

| 9 | 10 | TASK TRAINING DATA | | | |
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| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **5** | 5.1<br>5.2<br>5.3 | Knows electrical parameters (voltage, current and frequency)<br>Knows causes, effect of abnormal noises, vibrations its remedies.<br>Knows bearing, generator temperature range and its effect. | | | |

| | TASK PERFORMANCE TEST (SKILL ASSESSMENT) | | |
|---|---|---|---|
| **11** | **TASK TITLE : Checking relevant parameters/performances of MHP before load dispatch.**<br><br>**TASK NO : 5** | | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |
| **12** | **TEST FACTORS AND ITEMS** | **STANDARD MET** | **STANDARD NOT MET (Comments)** |
| | **DID THE CANDIDATE ?**<br>5.1 Check the voltage and frequency.<br>5.2 Check for any abnormal noises.<br>4.3 Check temperature of the bearing and generator. | | |

| TASK SPECIFICATION | |
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| **5** | **TASK NO: 6**<br>**Checking and maintaining of parameters after dispatching load.** **JOB TITTLE: Micro Hydro Operator, L - 2** |
| **6** | **TASK ELEMENTS:**<br>6.1 Switches the main load switches to ON position.<br>6.2 Checks the voltage, frequency and load current/power consumption.<br>6.3 Checks for any abnormal noise, vibration and fluctuation of parameters.<br>6.4 Checks temperature of the bearing and generator.<br>6.5 Checks penstock pressure periodically.<br>6.6 Repeats the sequence from 4.2 to 4.5 in every two hours and makes entry in logbook.<br>6.7 Checks the indicators such as light indicator, water level indicator and warning sound indicators (if available). |

| | TASK SPECIFICATION |
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| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Multimeter, logbook |
| **8** | **TASK PERFORMANCE STANDARDS:**<br>➢ Main load switch kept in ON position.<br>➢ Voltage, frequency observed and found within tolerance (± 2.5% for voltage and ± 3% for frequency) of desired value.<br>➢ Voltage, frequency and load current/power consumption observed and recorded in logbook.<br>➢ Abnormal sound and fluctuation of parameters observed.<br>➢ Bearing and generator temperature checked.<br>➢ Pressure gauge reading observed periodically and ensured in preset value.<br>➢ Above data recorded in logbook in every tow hours.<br>➢ Light indicators visually checked and ensured in ON position.<br>➢ Ensured normal operation without any warning sound. |

| 9 | 10 | TASK TRAINING DATA | | | |
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| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **6** | 6.1 | Knows electrical parameters (voltage, current and frequency). | | | |
| | 6.2 | Knows causes, effect of abnormal noises, vibrations and its remedies. | | | |
| | 6.3 | Knows bearing, generator temperature range and its effect. | | | |
| | 6.4 | Knows pressure gauge and its application. | | | |

| | TASK PERFORMANCE TEST (SKILL ASSESSMENT) | | |
|---|---|---|---|
| **11** | **TASK TITLE : Checking and maintaining of parameters after dispatching load.**<br><br>**TASK NO : 6** | | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |
| **12** | **TEST FACTORS AND ITEMS** | **STANDARD MET** | **STANDARD NOT MET (Comments)** |
| | **DID THE CANDIDATE ?**<br>6.1 Put ON main load switch.<br>6.2 Checks the voltage, frequency and load current/power consumption.<br>6.3 Check for any abnormal noises and fluctuation of parameters.<br>6.4 Observe temperature of the bearing and generator.<br>6.5 Read pressure gauge reading.<br>6.6 Record data in logbook every two hours. | | |

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| | 6.7 Check the indicators. | | |

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| | **TASK SPECIFICATION** |
| **5** | **TASK NO: 7**<br>**Normal shutting down of MHP plant.** **JOB TITTLE: Micro Hydro Operator, L - 2** |
| **6** | **TASK ELEMENTS:**<br>7.1 Ensures that the users know starting time of power plant.<br>7.2 Puts **OFF** the main load switch.<br>7.3 Puts **OFF** the jet deflector switch (in the case of Pelton turbine) for diverting the water jet deflector.<br>7.4 Closes the turbine valve gradually.<br>6.5 Closes the penstock valve gradually.<br>6.6 Allows small discharge to prevent freezing inside the penstock, if the temperature of the place of MHP plant is below freezing. |

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| | **TASK SPECIFICATION** |
| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Logbook |
| **8** | **TASK PERFORMANCE STANDARDS:**<br>➢ Ensured that users are informed the starting time of power plant.<br>➢ Main load switch kept in OFF position.<br>➢ In the case of Pelton turbine, jet deflectors switch kept in OFF position. |

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| | ➢ Turbine valve closed gradually.<br>➢ Penstock valve closed gradually. |

| 9 | 10 | TASK TRAINING DATA | | | |
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| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **7** | 7.1 | Knows different types valves and its application. | | | |

| | TASK PERFORMANCE TEST (SKILL ASSESSMENT) | | |
|---|---|---|---|
| **11** | **TASK TITLE : Normal shutting down of MHP plant.**<br><br>**TASK NO : 7** | | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |
| **12** | **TEST FACTORS AND ITEMS** | **STANDARD MET** | **STANDARD NOT MET (Comments)** |
| | **DID THE CANDIDATE ?**<br>7.1 Ensure that the users know the starting time of power plant.<br>7.2 Put OFF main load switch.<br>7.3 Put OFF jet deflector switch.<br>7.4 Close the turbine valve gradually.<br>7.5 Close the penstock valve gradually.<br>7.6 Allow small discharge to prevent freezing inside the penstock, if the | | |

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| | temperature of the place of MHP plant is below freezing. | | |

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| | **TASK SPECIFICATION** |
| **5** | **TASK NO: 8**<br>**Emergency shutting down of MHP plant.** **JOB TITTLE: Micro Hydro Operator, L - 2** |
| **6** | **TASK ELEMENTS:**<br>8.1 Conforms the emergency.<br>8.2 Turns **OFF** the main load switch.<br>8.3 Actuates the jet deflector if it is Pelton turbine.<br>8.4 Turns **OFF** the excitation of the generator (if available). |

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| | **TASK SPECIFICATION** |
| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Logbook. |
| **8** | **TASK PERFORMANCE STANDARDS:**<br>➢ Emergency confirmed.<br>a) Protective system failure and/or<br>b) Abnormal voltage and/or<br>c) Short circuit. |

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| | ➢ Put **OFF** the main load switch.<br>➢ Actuated the jet deflector if it is Pelton turbine.<br>➢ Put **OFF** the excitation of the generator (if available). |

| 9 | 10 | TASK TRAINING DATA | | | |
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| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **8** | 8.1<br>8.2<br><br>8.3<br>8.4 | Knows the emergency cases.<br>Knows protective system (MCB, MCCB, fuse, lightening arrestor, earthing, ground wire).<br>Knows turbine and its parts.<br>Knows generator and its parts. | | | |

| | TASK PERFORMANCE TEST (SKILL ASSESSMENT) | | |
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| **11** | **TASK TITLE : Emergency shutting down of MHP plant.**<br><br>**TASK NO : 8** | | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |
| **12** | **TEST FACTORS AND ITEMS** | **STANDARD MET** | **STANDARD NOT MET (Comments)** |
| | **<u>DID THE CANDIDATE ?</u>**<br>8.1 Conform the emergency.<br>8.2 Turn **OFF** the main load switch. | | |

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| | 8.3 Actuate the jet deflector if it is Pelton turbine.<br>8.4 Turn **OFF** the excitation of the generator (if available). | | |

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| | **TASK SPECIFICATION** |
| **5** | **TASK NO: 9**<br>**Installing electrical wiring of powerhouse** **JOB TITTLE: Micro Hydro Operator, L - 2** |
| **6** | **TASK ELEMENTS:**<br>9.1 Follows instructions/sketch diagrams.<br>9.2 Requisitions and collects required types and sizes of electrical wiring, fittings and accessories.<br>9.3 Drills holes for fixing/fitting accessories on the boxes/ceiling/wall.<br>9.4 Installs fitting plates and accessories on the boxes/ceiling/wall.<br>9.5 Stripes the end of wires/cables to the required length.<br>9.6 Connects wires to the terminals of electrical fittings and accessories.<br>9.7 Assembles lighting fixtures and installs them to the needed place.<br>9.8 Tests circuit for continuity/shorts/troubleshoots and rectifies. |

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| | **TASK SPECIFICATION** |
| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Instructions/sketch diagrams/manuals, bench vice, tools set-wire stripper, screw drivers, side cutter, hacksaw, tester, wire of sizes 3/22, 3/20, 1/18, 7/22, 7/20, power socket, one way switch, bulb, bulb holder, tube light, junction box, multimeter and logbook. |

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| **8** | **TASK PERFORMANCE STANDARDS:**<br>➢ Instruction followed.<br>➢ Circuit tested for continuity.<br>➢ Tightness and connections checked.<br>➢ Continuity tested for given fault circuit and trouble shoot and rectified. |

| **9** | **10** | **TASK TRAINING DATA** | | | |
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| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **9** | 9.1<br>9.2<br>9.3<br>9.4<br>9.5<br>9.6<br><br>9.7 | Knows procedures for requisitioning materials.<br>Knows conductors and insulators.<br>Knows specification of wires, electrical fittings and accessories.<br>Knows the use of drill machine, drill bits and selection of it.<br>Knows the use of screw drivers, hammer.<br>Knows the use of pliers, side cutter, wire stripper, hacksaw, knife, measuring tape.<br>Knows protective system, earthing system. | Measurement of dimensions in metric and foot pound system. | Interprets the wiring plan/sketch.<br>Understands electrical symbols. | • Safe use of handling tools/machines and equipment.<br>• Importance of electrical safety.<br>• Hazards of electrical shock.<br>• Perform first aid. |

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| | TASK PERFORMANCE TEST (SKILL ASSESSMENT) | | |
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| **11** | **TASK TITLE : Installing electrical wiring of powerhouse.**<br><br>**TASK NO : 9** | | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |
| **12** | **TEST FACTORS AND ITEMS** | **STANDARD MET** | **STANDARD NOT MET (Comments)** |
| | **DID THE CANDIDATE ?**<br>9.1 Follow instructions/sketch diagrams.<br>9.2 Requisite and collect required types and sizes of electrical wiring, fittings and accessories.<br>9.3 Drill holes for fixing/ fittings accessories on the boxes/ceiling/wall.<br>9.4 Install fitting plates and accessories on the boxes/ceiling/wall.<br>9.5 Stripe the end of wires/cables to the required length.<br>9.6 Connect wires to the terminals of electrical fittings and accessories.<br>9.7 Assemble lighting fixtures and install them to the needed place. | | |

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| | 9.8 Test circuit for continuity/shorts/troubleshoot and rectify. | | |

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| | **TASK SPECIFICATION** |
| **5** | **TASK NO: 10**<br>**Checking and maintaining logbook.** **JOB TITTLE: Micro Hydro Operator, L - 2** |
| **6** | **TASK ELEMENTS:**<br>10.1 Reads and notes down current, voltage, frequency, power consumption, peak load and running time in a logbook.<br>10.2 Maintains a daily diary of works carried out.<br>10.3 Makes remarks for any abnormal running of the plant if found. |

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| | **TASK SPECIFICATION** |
| **7** | **TASK PERFORMANCE REQUIREMENTS :**<br>Multimeter, logbook. |

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| **8** | **TASK PERFORMANCE STANDARDS:**<br><br>➢ Electrical parameters-current, voltage, frequency, load current observed and noted down in logbook.<br>➢ Made a daily diary of works carried out.<br>➢ Made remarks in the logbook for any abnormal running of the plant, if found. |

| **9** | **10** | **TASK TRAINING DATA** | | | |
|---|---|---|---|---|---|
| **TASK NO:** | **T. E. No.** | **TECHNICAL KNOWLEDGE** | **APPLIED CALCULATION** | **GRAPHIC INFORMATION** | **SAFETY & HYGENE** |
| **10** | 10.1<br>10.2 | Knows electrical parameters-current, voltage and frequency.<br>Knows logbook and its application. | | | |

| | **TASK PERFORMANCE TEST (SKILL ASSESSMENT)** | |
|---|---|---|
| **11** | **TASK TITLE : Checking and maintaining logbook.**<br><br>**TASK NO : 10** | **LOCATION OF TEST :**<br>**CANDIDATE'S NAME :**<br>**EVALUATORS NAMES:** |

| 12 | TEST FACTORS AND ITEMS | STANDARD MET | STANDARD NOT MET (Comments) |
|---|---|---|---|
| | **DID THE CANDIDATE ?**<br>10.1 Observe and note down current, voltage, frequency, power consumption, peak load and running time in a logbook.<br>10.2 Make a daily diary of works carried out.<br>10.3 Remark for any abnormal running of the plant if found. | | |