

BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Diploma in Electrical/Electronic Engineering
Unit or Component number and title	Unit 1 Mechanical Principle Unit 2 Delivery of Engineering Processes Safely as a Team Unit 3 Product Design and Manufacture in Engineering Unit 8 Further Engineering Mathematics Unit 9 Work Experience in the Engineering Sector Unit 57 Electrical and Electronic Principles Unit 14 Electrical Installation of Hardware and Cables Unit 16 Three-Phase Electrical Systems Unit 18 Electrical Power Distribution and Transmission Unit 21 Electronic Measurement and Testing of Circuits Unit 30 Mechanical Measurement and Inspection Technology Unit 58 Entrepreneurship and Intrapreneurship in Practice
Learning aim(s) (For NQF/RQF only)	The aim of vocational educational program – “Rail Power Supply System’s mechanic” is to prepare competitive staff in electricity.
Assignment title	High-Voltage Electrician
Assessor	Lika Zaalishvili
Hand out date	12.10.2020
Hand in deadline	12.10.2021

Vocational Scenario or Context	<p>The represented vocational educational program – “High-Voltage Electrician ” of Pearson BTEC International Level 3 Diploma (720 GLH) in Electrical/Electronic Engineering is a part of our vocational educational program “Rail Power Supply system’s mechanic”, so the vocational students will be able to get the Pearson BTEC International Level 3 Diploma after finishing 720 GLH and also after finishing 2250 (GLH) and qualification exams they will get the college diploma.</p>
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Task 1	
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	The general modules of the vocational educational program “High-Voltage Electrician” that are the bases to master a profession.
Checklist of evidence required	Checklist of evidence is worked out separately for each module.
Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
Unit 1	<ol style="list-style-type: none"> 1. Correctly list the metal-working tools; 2. Correctly describe the purpose of metal-working tools; 3. Describe the rules for using of metal-working tools according to the attached instruction; 4. List the tools necessary for marking work; 5. Correctly describe the using rules of tools needed for marking work. 6. Correctly inspect the operation of tool; 7. Safely overcome the simple malfunction of metal-working tools; 8. Choose the metal-working tools needed for the work to be performed; 9. Use the metal-working tools as intended; 10. Keep the used tools according to the instruction after finishing the work. 11. Properly perform the marking out processes according to the drawing; 12. Inspect the accuracy of performed work after finishing the marking work; 13. Properly perform bending and straightening process of metal-working materials; 14. Properly perform the cutting and drilling process; 15. Properly perform the operation of riveting; 16. Properly perform the filing process.
Unit 2	<ol style="list-style-type: none"> 1. Correctly describe the rules of work protection and safety technique during the measurement of electrical parameters of catenary, traction and equipment and machineries of transformer substations. 2. Describe the organizing rules of protective equipment and workplace regarding to the requirements of labour protection and safety technique. 3. Use the protective equipment and protect the organizing rules of workplace according to the work protection and safety techniques; 4. List protective equipment and the organizing rules of workplace according to the work protection and safety technique; 5. Properly select the appropriate methods of parameters measurement of protective equipment according to the rules required by work safety. 6. Properly perform the measurement works according to the technological card and the safety rules; 7. Accurately describe the performance of measurements according to the technological card and the safety rules. 8. List the protective equipment and the rules of workplace arrangement according to the requirements of work protection and safety; 9. Perform the measurements according to the technological card and the safety rules.

	<p>10. Use protective equipment according to the requirements of work protection and safety techniques and protect the organizing rules of workplace;</p> <p>11. Properly describe the purpose and rules of protective equipment using according to the work safety rule;</p> <p>12. Properly describe the safety rules and the principles of measurements according to the technological card;</p> <p>13. List the protective equipment according to the work protection and safety techniques;</p> <p>14. Describe the organizing of workplace according to the requirements of work protection and safety;</p> <p>15 Use the protective equipment according to the work protection and safety technique;</p> <p>16. Follow the organizing rules workplace according to the work protection and safety.</p>
Unit 3	<ol style="list-style-type: none"> 1. Correctly determine the stages and time for performance of professional task; 2. Correctly determine the prospective risks and the ways to prevent them. 3. Correctly determine the communication and relationship types and responsibilities according to the task to be performed; 4. Correctly select important resources and the methods for working; 5. Make an optimal work plan according to the task instruction; 6. Perform professional task (product/service) according to the established requirements and norms and taking into consideration the achieved learning outcomes; 7. Make a properly decision to solve the problem arose during the performance of professional task; 8. Find the necessary modern information to perform the professional task; 9. Evaluate the performed work according to the established instructions; 10. Ensure the presentation of performed product/result with instruction; 11. Properly evaluate the consequences of acting in unforeseen situation; 12. Develops the detail report of performed work.
Unit 8	<ol style="list-style-type: none"> 1. Manipulate and simplify the algebraic expressions with using of Laws of indices and Laws of logarithms. 2. Solve linear equation with drawing of linear graphs with using of experimental data; 3. Calculate the slope of linear equation, point of intersection and line equation; 4. Solve equations with using of radian, sine, cosine and tangent of circular and quadratic measurements; 5. Drawing trigonometric functions; 6. Calculate the volume and area with using of standard formulas; 7. Collect data and create statistical Frequency Curve; 8. Calculate data mode, median and mean; 9. Use basic rules of differential calculus for solving engineering tasks; 10. Use Indefinite calculus for solving an engineering problem; Use Definite Integral Calculus for solving an engineering problem.
Unit 57	<ol style="list-style-type: none"> 1. Calculate electric current, voltage and resistor with using of laws Ohm's law and Kirchhoffs's law in direct current circuit; 2. Properly measures with using of multimeter in direct current conditions; 3. Properly measure direct and reversible properties in two different types of semiconductor diode; 4. Properly describe the types and functions of capacitor; 5. Correctly describe the types and functions of conductors;

	<ol style="list-style-type: none"> 6. Correctly calculate the level of capacity, voltage, charge and power in circuit that includes three capacitors with parallel combination; 7. Correctly describes the characteristics of magnetic field; 8. Correctly describe the connection between radiation flow (B) and field intensity (H); 9. Correctly describe the electromagnetic conduction principles and their using; 10. Correctly count reactance of L-C components in alternating current circuit; 11. Correctly calculate reactance for R-L-C components in alternating current circuit; 12. Correctly determine the input and output with using of oscilloscope in single-phase alternating current circuit.
Task 2	<p>The general-technical modules of the vocational educational program "High-Voltage Electrician" which serve to master a profession.</p>
Checklist of evidence required	<p>Checklist of evidence is worked out separately for each module.</p>
Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
Unit 16	<ol style="list-style-type: none"> 1. Correctly determine the sequence of ongoing and overhauling of three-phase system in circuit and substations according to the pre-arranged schedule; 2. Correctly list the sequence of ongoing and overhauling of three-phase system in circuit and substations according to the technological process; 3. Correctly list the ongoing and overhauling safety rules of three-phase systems in circuit and substations; 4. Correctly explains the principle of workplace arrangement; 5. Correctly explain the rules and activities for safe impact on environment, instructions of environmental protection; 6. Correctly formulate the functions and duties of brigade members during the repairing work; 7. Plan the ongoing and overhauling in circuit and substations of three-phase systems. 8. Correctly determine the sequence of ongoing and overhauling of three-phase system in circuit and substations according to the technological process; 9. Implement the ongoing and overhauling in the circuit and substations of three-phase systems according to the rules; 10. Follow the safety rules during the repairing in circuit and substations of three-phase systems; 11. Correctly use the workwear and special equipment;

	12. Correctly organize workplace; 13. Follow the rules and activities of safe impact on environment, instructions of environmental protection;
Unit 21	1. Correctly explain the construction, reading and design rules of electrical schemes of substations equipment and machineries; 2. Correctly choose the measurement methods and its instrument according to the technological card; 3. Correctly choose the methods for electrical measurement of substations equipment and machineries according to the technological process; 4. Correctly choose the appropriate instruments for electrical measurements of equipment and machineries according to the technological process; 5. Correctly determine the appropriate methods of parameters measurements of used protective instruments; 6. Correctly list the measurement work with safety rules according to the technological card; 7. Correctly list the selection rules of appropriate methods for electrical parameters of low-voltage electrical transmission lines according to the technological instructions; 8. Correctly list the selection rules of appropriate methods for electrical parameters of high-voltage electrical transmission lines according to the technological instructions; 9. Correctly list and describes the selection rules and methods of measuring means and methods according to the technological card; 10. Correctly choose the measuring tools and measurement methods according to the technological card; 11. Correctly list the selection methods of measuring tools and measurement methods according to the technological card.

Task 3	Vocational modules that serves to master a profession.
Checklist of evidence required	Checklist of evidence is worked out separately for each module.
Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
Unit 9	1. Correctly list and protects the requirements of grid inspection rules; 2. Correctly determine the inspection rule of electrical connectors; 3. Correctly explain the retainer constructions and their inspection rules according to the safety techniques; 4. Correctly explain the inspection rules of references and joint assembly; 5. Correctly list the requirements of work protection and technical safety rules; 6. Correctly determine the working principles of brigade and its members functions and duties; 7. Correctly explain the organizing rules of workplace;

	<ol style="list-style-type: none"> 8. Correctly list the types of workwear and special equipment, rules and instruction of their use; 9. Correctly explain the rules and activities for safe impact on environment, instructions of environmental protection; 10. Determine the repair work of power supply equipment and devices; 11. Determine the needs to allocate time according to the type of work, and calculate the duration according to the complexity; 12. Plan the repair work of circuit according to the data of defect acts and choose the staff with an appropriate competence; 13. Distribute the work among the members of brigade according to its functioning; 14. Prepare the protective equipment and devices and use them according to the task; 15. Correctly use the workwear and special equipment; 16. Correctly organises workplace; 17. Follow the rules and activities of safe impact on environment, instructions of environmental protection.
Unit 14	<ol style="list-style-type: none"> 1. Plan the repair work of substation apparatus and cable system according to the pre-arranged Schedule; 2. Correctly list the sequence of repair work of substation apparatus according to the technological process; 3. Correctly list the safety rules during the repairing of substations apparatus; 4. Correctly determine the sequence of repair work of cable system according to the technological process; 5. Correctly formulate the safety rule during the repair work of cable system; 6. Correctly explain the organizing rules of workplace; 7. Correctly explain the rules and activities for safe impact on environment, instructions of environmental protection; 8. Correctly formulate the functions and duties of brigade members during the repairing work; 9. Plan the repairing work of substation apparatus and cable system according to the pre-arranged Schedule; 10. Determine the sequence of repair work of substation apparatus and cable system according to the technological process; 11. Repair of substation apparatus and cable farm according to the rules; 12. Follow the safety rules during the repair of substation apparatus and cable farm; 13. Correctly use the workwear and special equipment; 14. Correctly organize the workplace; 15. Follow the rules and activities of safe impact on environment, instructions of environmental protection.
Unit 18	<ol style="list-style-type: none"> 1. Correctly determine the principal schemes of circuits and substations describes the sources of electricity power supply and distribution; 2. Correctly determine the transmission rules of information about troubles found in equipment of electricity. 3. Correctly lists the rules of data formatting in the appropriate journal according to the complexity of troubles and disorders found in electricity equipment; 4. Correctly describe the information transfer procedure about detected troubles; 5. Correctly records the malfunctions and troubles detected in electrical equipment according to the instruction; 6. Correctly implements the measures for detected malfunction in electrical equipment taking into consideration their complexity;

	<ol style="list-style-type: none"> 7. Properly draws up an act after commission inspection; 8. Provide the information about the detected violation according to the established rule; 9. Make the report properly of performed work in order to submit to their leadership;
<p>unit 30</p>	<ol style="list-style-type: none"> 1. Correctly choose the appropriate methods of mechanical and geometrical parameters measurement of substation equipment and machineries according to the technological process; 2. Correctly choose the appropriate tools of mechanical and geometrical parameters measurement of equipment and machineries according to the technological process; 3. Correctly determine the appropriate methods of parameters measurement of protective tools used in Power Supply; 4. Correctly select the measurements tools and methods according to the technological card; 5. Perform the work with principle of distribution according to the responsibility entrusted to him; 6. Implement the measurement work according to the technological card in compliance with technical safety rules; 7. Correctly get the task given by the heads and submit a report on performed work in accordance with the established rules of brigade work; 8. Correctly classify the methods of mechanical and geometrical measuring of catenary according to the instructions; 9. Properly lists the appropriate methods of catenary mechanical and geometrical parameters according to the instructions; 10. Correctly list the methods of parameters measurement of protective equipment; 11. Correctly determine the rules of parameters measurement work of high-voltage and low-voltage electrical transmission lines; 12. Correctly list the selection rules of measuring instruments and measurement methods according to the technological card; 13. Correctly list the functions and responsibilities of brigade members and the rules of work distribution according to the instructions during the parameters measurement work of catenary; 14. Correctly implement the mechanical and geometrical parameters measurement work of low-voltage and high-voltage electrical transmission lines according to the technological process; 15. Correctly select the measuring instruments and measurement methods according to the technological card; 16. Properly perform the work with principle of distribution according to the responsibility entrusted to you; 17. Correctly implement the parameters measurement work of catenary according to the functions and duties distributed among the brigade members and the rules of work performance.
<p>Unit 58</p>	<ol style="list-style-type: none"> 1. Generates business idea with arguments; 2. Properly estimate his own weakness and strength sides; 3. Prove the decision about location of enterprise/organization taking into consideration the business specifics; 4. Research the market taking into consideration the business specifics; 5. Correctly prove the appropriateness of chosen organizational-legal form taking into consideration the business specifics; 6. Adequately determine the risks associated with implementation of business idea; 7. Correctly identify important licenses to the certificates taking into consideration the business specifics;

	<ol style="list-style-type: none"> 8. Correctly describe the technological process of production/ service taking into consideration of business specifics; 9. Correctly identify equipment and taking into consideration the chosen technology; 10. Determine important materials and raw materials taking into consideration the business specifics; 11. Determine important human resources according to the business specifics; 12. Correctly choose delivery form taking into consideration the business specifics; 13. Correctly choose the types of selling taking into consideration the business specifics; 14. Correctly choose the stimulate mechanisms taking into consideration the business and customers specifics; 15. Correctly determine costs of goods/service; 16. Correctly describe the source of finance; 17. Correctly determine expected receipts according to the business specifics; 18. Correctly list expected expenses according to the business specifics; 19. Correctly identify the taxes to be input in budget according to the business specifics; 20. Correctly calculate and expected profit.
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Sources of information to support you with this Assignment	<ul style="list-style-type: none"> • Information of BTEC; • Framework of specialty electricity; • Vocational educational program- Rail Power Supply System's mechanic;
Other assessment materials attached to this Assignment Brief	<ul style="list-style-type: none"> • Program; • Modules; • Assessment form; • Assessment methods.

FOR 2012 L1/2 FIRSTS ONLY: If you have not achieved the Level 2 criteria, your work will be assessed to determine if the following Level 1 criteria have been met.

To achieve the criteria you must show that you are able to:	Unit	Criterion reference
<ol style="list-style-type: none"> 1. Correctly describe the rules of work protection and safety technique during the measurement of electrical parameters of catenary, traction and equipment and machineries of transformer substations. 2. Describe the organizing rules of protective equipment and workplace regarding to the requirements of labour protection and safety technique. 3. Use the protective equipment and protect the organizing rules of workplace according to the work protection and safety techniques; 4. Accurately describe the performance of measurements according to the technological card and the safety rules. 5. List the protective equipment and the rules of workplace arrangement according to the requirements of work protection and safety; 6. Perform the measurements according to the technological card and the safety rules. 	Unit 2	P1-P8 M1-M3

<p>7. Use protective equipment according to the requirements of work protection and safety techniques and protect the organizing rules of workplace;</p>		
<ol style="list-style-type: none"> 1. Correctly determine the stages and time for performance of professional task; 2. Correctly determine the prospective risks and the ways to prevent them. 3. Correctly determine the communication and relationship types and responsibilities according to the task to be performed; 4. Correctly select important resources and the methods for working 5. Make an optimal work plan according to the task instruction. 	Unit 3	P1-P11 M1-M9
<ol style="list-style-type: none"> 1. Correctly list and protects the requirements of grid inspection rules; 2. Correctly determine the inspection rule of electrical connectors; 3. Correctly explain the retainer constructions and their inspection rules according to the safety techniques; 4. Correctly explain the inspection rules of references and joint assembly; 5. Determine the repair work of power supply equipment and devices; 6. Determine the needs to allocate time according to the type of work, and calculate the duration according to the complexity; 7. Plan the repair work of circuit according to the data of defect acts and choose the staff with an appropriate competence; 	Unit 9	P1-P8 M1-M4
<ol style="list-style-type: none"> 1. Plan the repair work of substation apparatus and cable system according to the pre-arranged Schedule; 2. Correctly list the sequence of repair work of substation apparatus according to the technological process; 3. Correctly list the safety rules during the repairing of substations apparatus; 4. Correctly determine the sequence of repair work of cable system according to the technological process; 5. Correctly formulate the safety rule during the repair work of cable system; 6. Correctly explain the organizing rules of workplace; 7. Correctly explain the rules and activities for safe impact on environment, instructions of environmental protection; 8. Correctly formulate the functions and duties of brigade members during the repairing work; 9. Plan the repairing work of substation apparatus and cable system according to the pre-arranged Schedule; 10. Determine the sequence of repair work of substation apparatus and cable system according to the technological process; 11. Repair of substation apparatus and cable farm according to the rules; 12. Follow the safety rules during the repair of substation apparatus and cable farm; 13. Correctly use the workwear and special equipment; 14. Correctly organize the workplace; 15. Follow the rules and activities of safe impact on environment, instructions of environmental protection. 	Unit 14	P1-P6 M1-M4
<ol style="list-style-type: none"> 1. Correctly determine the sequence of ongoing and overhauling of three-phase system in circuit and substations according to the pre-arranged schedule; 	Unit 16	P1-P7 M1-M4

<ol style="list-style-type: none"> 2. Correctly list the sequence of ongoing and overhauling of three-phase system in circuit and substations according to the technological process; 3. Correctly list the ongoing and overhauling safety rules of three-phase systems in circuit and substations; 4. Plan the ongoing and overhauling in circuit and substations of three-phase systems. 5. Correctly determine the sequence of ongoing and overhauling of three-phase system in circuit and substations according to the technological process; 6. Implement the ongoing and overhauling in the circuit and substations of three-phase systems according to the rules; 7. Follow the safety rules during the repairing in circuit and substations of three-phase systems; 		
<ol style="list-style-type: none"> 1. Correctly determine the principal schemes of circuits and substations describes the sources of electricity power supply and distribution; 2. Correctly determine the transmission rules of information about troubles found in equipment of electricity. 3. Correctly lists the rules of data formatting in the appropriate journal according to the complexity of troubles and disorders found in electricity equipment; 4. Correctly describe the information transfer procedure about detected violations; 5. Properly describes the mechanism of making report of performed work. 	Unit 18	P1-P6 M1-M5
<ol style="list-style-type: none"> 1. Correctly explain the construction, reading and design rules of electrical schemes of substations equipment and machineries; 2. Correctly choose the measurement methods and its instrument according to the technological card; 3. Correctly list the selection rules of appropriate methods for electrical parameters of low-voltage electrical transmission lines according to the technological instructions; 4. Correctly list the selection rules of appropriate methods for electrical parameters of high-voltage electrical transmission lines according to the technological instructions; 5. Correctly list and describes the selection rules and methods of measuring means and methods according to the technological card. 	Unit 21	P1_P7 M1-M5
<ol style="list-style-type: none"> 1. Correctly choose the appropriate methods of mechanical and geometrical parameters measurement of substation equipment and machineries according to the technological process; 2. Correctly choose the appropriate tools of mechanical and geometrical parameters measurement of equipment and machineries according to the technological process; 3. Correctly determine the appropriate methods of parameters measurement of protective tools used in Power Supply; 4. Correctly select the measurements tools and methods according to the technological card; 5. Perform the work with principle of distribution according to the responsibility entrusted to him; 6. Implement the measurement work according to the technological card in compliance with technical safety rules; 	Unit 30	P1_P7 M1-M5

<p>7. Correctly get the task given by the heads and submit a report on performed work in accordance with the established rules of brigade work;</p>		
<ol style="list-style-type: none"> 1. Correctly list the metal-working tools; 2. Correctly describe the purpose of metal-working tools; 3. Describe the rules for using of metal-working tools according to the attached instruction; 4. List the tools necessary for marking work; 5. Correctly describe the using rules of tools needed for marking work. 6. Correctly inspect the operation of tool; 7. Safely overcome the simple malfunction of metal-working tools; 8. Choose the metal-working tools needed for the work to be performed; 9. Use the metal-working tools as intended; 10. Keep the used tools according to the instruction after finishing the work. 11. Properly perform the marking out processes according to the drawing; 12. Inspect the accuracy of performed work after finishing the marking work; 13. Properly perform bending and straightening process of metal-working materials; 14. Properly perform the cutting and drilling process; 15. Properly perform the operation of riveting; 16. Properly perform the filing process. 	Unit 1	P1-P8 M1-M4
<ol style="list-style-type: none"> 1. Generates business idea with arguments; 2. Properly estimate his own weakness and strength sides; 3. Prove the decision about location of enterprise/organization taking into consideration the business specifics; 4. Research the market taking into consideration the business specifics; 5. Correctly prove the appropriateness of chosen organizational-legal form taking into consideration the business specifics; 6. Adequately determine the risks associated with implementation of business idea; 7. Correctly identify important licenses to the certificates taking into consideration the business specifics; 8. Correctly describe the technological process of production/ service taking into consideration of business specifics; 9. Correctly identify equipment and taking into consideration the chosen technology; 10. Determine important materials and raw materials taking into consideration the business specifics; 11. Determine important human resources according to the business specifics; 12. Correctly choose delivery form taking into consideration the business specifics; 13. Correctly choose the types of selling taking into consideration the business specifics; 14. Correctly choose the stimulate mechanisms taking into consideration the business and customers specifics; 15. Correctly determine costs of goods/service; 16. Correctly describe the source of finance; 17. Correctly determine expected receipts according to the business specifics; 18. Correctly list expected expenses according to the business specifics; 	Unit 58	P1_P6 M1-M3

<p>19. Correctly identify the taxes to be input in budget according to the business specifics; 20. Correctly calculate and expected profit.</p>		
<ol style="list-style-type: none"> 1. Manipulate and simplify the algebraic expressions with using of Laws of indices and Laws of logarithms. 2. Solve linear equation with drawing of linear graphs with using of experimental data; 3. Calculate the slope of linear equation, point of intersection and line equation; 4. Solve equations with using of radian, sine, cosine and tangent of circular and quadratic measurements; 5. Drawing trigonometric functions; 6. Calculate the volume and area with using of standard formulas; 7. Collect data and create statistical Frequency Curve; 8. Calculate data mode, median and mean; 9. Use basic rules of differential calculus for solving engineering tasks; <p>Use Indefinite calculus for solving an engineering problem; Use Definite Integral Calculus for solving an engineering problem.</p>	Unit 8	P1-P6 M1-M5
<ol style="list-style-type: none"> 1. Calculate electric current, voltage and resistor with using of laws Ohm's law and Kirchhoffs's law in direct current circuit; 2. Properly measures with using of multimeter in direct current conditions; 3. Properly measure direct and reversible properties in two different types of semiconductor diode; 4. Properly describe the types and functions of capacitor; 5. Correctly describe the types and functions of conductors; 6. Correctly calculate the level of capacity, voltage, charge and power in circuit that includes three capacitors with parallel combination; 7. Correctly describes the characteristics of magnetic field; 8. Correctly describe the connection between radiation flow (B) and field intensity (H); 9. Correctly describe the electromagnetic conduction principles and their using; 10. Correctly count reactance of L-C components in alternating current circuit; 11. Correctly calculate reactance for R-L-C components in alternating current circuit; 12. Correctly determine the input and output with using of oscilloscope in single-phase alternating current circuit. 	Unit 57	P1_P8 M1-M4