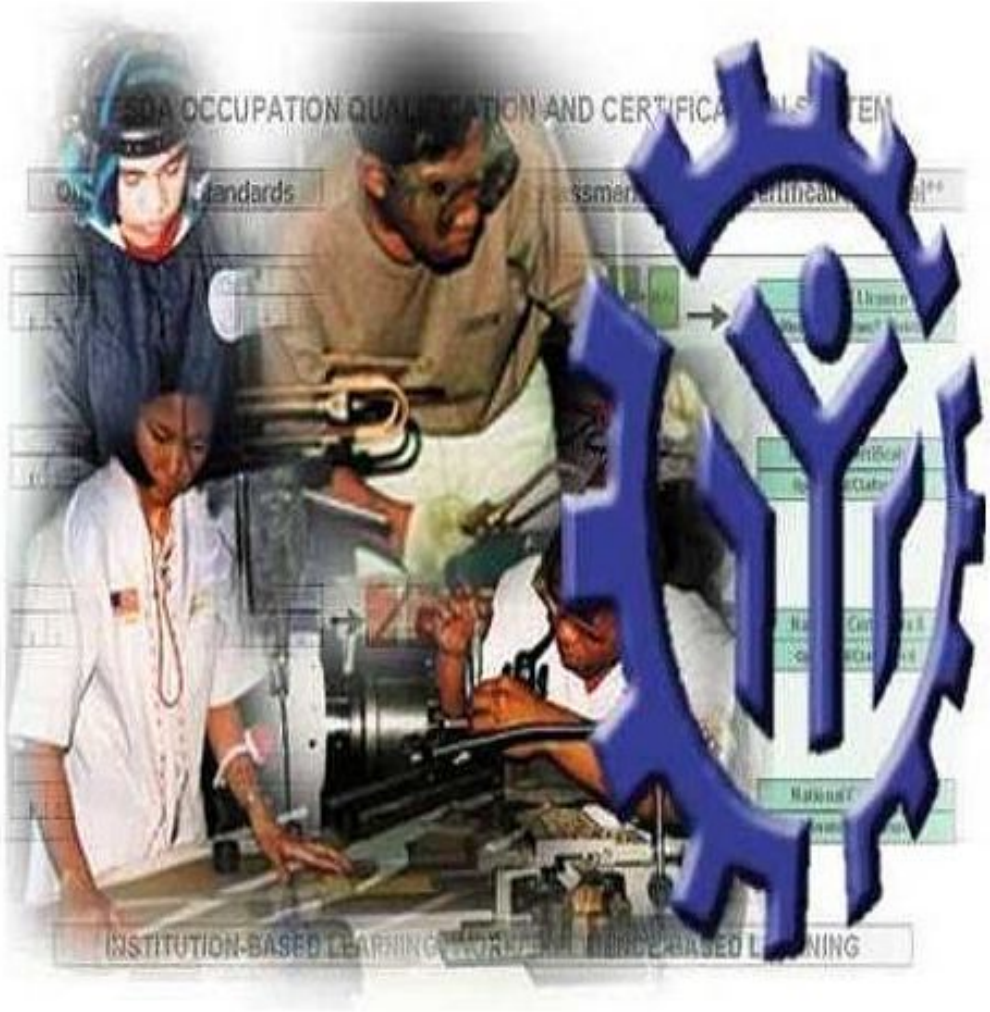
TRAINING REGULATIONS



PROGRAMMING (ORACLE DATABASE) NC III

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
East Service Road, South Superhighway, Taguig City, Metro Manila

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ICT SECTOR

Programming (Oracle Database) - NATIONAL CERTIFICATE LEVEL III

TRAINING REGULATIONS FOR
PROGRAMMING (ORACLE DATABASE) NC III

Section 1 PROGRAMMING (ORACLE DATABASE) NC III QUALIFICATION

This TESDA Course is delivered in cooperation with Oracle's Workforce Development Program (WDP). Oracle Corporation launched WDP to address the continued global information technology (IT) worker shortage and need for accessible and low cost IT skills training. WDP enables participating educational institutions to deliver Oracle training in full-time and part-time programs for students in their local communities. WDP training will prepare students for Oracle certification testing. With the widely-acclaimed credential of Oracle certification, WDP students are readied for a variety of entry-level Oracle job-roles as well as career advancement.

The **Programming (Oracle Database) NC III** Qualification consists of competencies that a person must achieve to develop or write program codes using a personal computer or workstation as part of a systems development team. It includes core competencies on programming language on PL/SQL, such as to write SQL queries to access data stored in an Oracle database and use functions to customize data output.

At the end of the course, participants should be equipped with sufficient knowledge to take and pass the internationally acknowledged Oracle PL/SQL Certified Associate and Certified Professional Exam.

This Qualification is packaged from the competency map of the Information and Communication Technology Industry (Service sector) as shown in Annex A.

Oracle Certification Explanations:

ORACLE Certified Associate

The Oracle Certified Associate (OCA) credential is typically the first step toward achieving the flagship Oracle Certified Professional certification. The OCA credential ensures that the individual is equipped with fundamental skills, providing a strong foundation for supporting Oracle products. An OCA credential is available for several of today's most in-demand technology job roles.

ORACLE Certified Professional

The Oracle Certified Professional (OCP) credential is the benchmark of professional skill and technical expertise required to manage, develop, or implement enterprise-wide databases, middleware, or applications. Increasingly, IT managers use the OCP credential to evaluate the qualifications of employees and job candidates.

The units of competency comprising this qualification include the following:

CODE NO.	BASIC COMPETENCIES
5 00 311 1 09	Lead workplace communication
5 00 311 1 10	Lead small teams
5 00 311 1 11	Develop and practice negotiation skills
5 00 311 1 12	Solve problems related to work activities
5 00 311 1 13	Use mathematical concepts and techniques
5 00 311 1 14	Use relevant technologies

CODE NO.	COMMON COMPETENCIES
ICT315202	Apply quality standards
ICT311203	Perform computer operations

CODE NO.	CORE COMPETENCIES
ICT313361	Perform relational database management in Oracle database technology
ICT313362	Use and apply PL/SQL Programming Language
ICT313363	Design and tune PL/SQL Language

A person who has achieved this Qualification can be employed in any or more of the following:

- Application Developers
- Forms Developer
- Functional Implementer
- PL/SQL Developer
- Portal Developer
- Reports Developer
- Technical Consultant

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in **Programming (Oracle Database) NC III.**

BASIC COMPETENCIES

UNIT OF COMPETENCY: LEAD WORKPLACE COMMUNICATION

UNIT CODE : 500311109

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to lead in the dissemination and discussion of ideas, information and issues in the workplace.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Communicate information about workplace processes	1.1. Appropriate ***communication method*** is selected 1.2. Multiple operations involving several topics areas are communicated accordingly 1.3. Questions are used to gain extra information 1.4. Correct sources of information are identified 1.5. Information is selected and organized correctly 1.6. Verbal and written reporting is undertaken when required 1.7. Communication skills are maintained in all situations
2. Lead workplace discussions	2.1. Response to workplace issues are sought 2.2. Response to workplace issues are provided immediately 2.3. Constructive contributions are made to workplace discussions on such issues as production, quality and safety 2.4. Goals/objectives and action plan undertaken in the workplace are communicated
3. Identify and communicate issues arising in the workplace	3.1. Issues and problems are identified as they arise 3.2. Information regarding problems and issues are organized coherently to ensure clear and effective communication 3.3. Dialogue is initiated with appropriate personnel 3.4. Communication problems and issues are raised as they arise

RANGE OF VARIABLES

VARIABLE	RANGE
1. Methods of communication	1.1. Non-verbal gestures 1.2. Verbal 1.3. Face to face 1.4. Two-way radio 1.5. Speaking to groups 1.6. Using telephone 1.7. Written 1.8. Internet

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Dealt with a range of communication/information at one time 1.2. Made constructive contributions in workplace issues 1.3. Sought workplace issues effectively 1.4. Responded to workplace issues promptly 1.5. Presented information clearly and effectively written form 1.6. Used appropriate sources of information 1.7. Asked appropriate questions 1.8. Provided accurate information
2. Underpinning knowledge	2.1. Organization requirements for written and electronic communication methods 2.2. Effective verbal communication methods
3. Underpinning Skills	3.1. Organize information 3.2. Understand and convey intended meaning 3.3. Participate in variety of workplace discussions 3.4. Comply with organization requirements for the use of written and electronic communication methods
4. Resource Implications	The following resources **MUST** be provided: 4.1. Variety of Information 4.2. Communication tools 4.3. Simulated workplace
5. Methods of Assessment	Competency may be assessed through: 5.1. Competency in this unit must be assessed through 5.2. Direct Observation 5.3. Interview
6. Context for Assessment	6.1. Competency may be assessed in the workplace or in simulated workplace environment

UNIT OF COMPETENCY: LEAD SMALL TEAMS

UNIT CODE : 500311110

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes to lead small teams including setting and maintaining team and individual performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Provide team leadership	1.1. ***Work requirements*** are identified and presented to team members 1.2. Reasons for instructions and requirements are communicated to team members 1.3. ***Team members' queries and concerns*** are recognized, discussed and dealt with
2. Assign responsibilities	2.1. Duties, and responsibilities are allocated having regard to the skills, knowledge and aptitude required to properly undertake the assigned task and according to company policy 2.2. Duties are allocated having regard to individual preference, domestic and personal considerations, whenever possible
3. Set performance expectations for team members	3.1. Performance expectations are established based on client needs and according to assignment requirements 3.2. Performance expectations are based on individual team members duties and area of responsibility 3.3. Performance expectations are discussed and disseminated to individual team members
4. Supervise team performance	4.1. ***Monitoring of performance*** takes place against defined performance criteria and/or assignment instructions and corrective action taken if required 4.2. Team members are provided with **feedback**, positive support and advice on strategies to overcome any deficiencies 4.3. ***Performance issues*** which cannot be rectified or addressed within the team are referenced to appropriate personnel according to employer policy 4.4. Team members are kept informed of any changes in the priority allocated to assignments or tasks which might impact on client/customer needs and satisfaction 4.5. Team operations are monitored to ensure that employer/client needs and requirements are met 4.6. Follow-up communication is provided on all issues affecting the team 4.7. All relevant documentation is completed in accordance with company procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work requirements	1.1. Client Profile 1.2. Assignment instructions
2. Team member's concerns	2.1. Roster/shift details
3. Monitor performance	3.1. Formal process 3.2. Informal process
4. Feedback	4.1. Formal process 4.2. Informal process
5. Performance issues	5.1. Work output 5.2. Work quality 5.3. Team participation 5.4. Compliance with workplace protocols 5.5. Safety 5.6. Customer service

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Maintained or improved individuals and/or team performance given a variety of possible scenario 1.2. Assessed and monitored team and individual performance against set criteria 1.3. Represented concerns of a team and individual to next level of management or appropriate specialist and to negotiate on their behalf 1.4. Allocated duties and responsibilities, having regard to individual's knowledge, skills and aptitude and the needs of the tasks to be performed 1.5. Set and communicated performance expectations for a range of tasks and duties within the team and provided feedback to team members
2. Underpinning Knowledge	2.1. Company policies and procedures 2.2. Relevant legal requirements 2.3. How performance expectations are set 2.4. Methods of Monitoring Performance 2.5. Client expectations 2.6. Team member's duties and responsibilities
3. Underpinning Skills	3.1. Communication skills required for leading teams 3.2. Informal performance counseling skills 3.3. Team building skills 3.4. Negotiating skills
4. Resource Implications	The following resources **MUST** be provided: 4.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 4.2. Materials relevant to the proposed activity or task
5. Methods of Assessment	Competency may be assessed through: 5.1. Direct observations of work activities of the individual member in relation to the work activities of the group 5.2. Observation of simulation and/or role play involving the participation of individual member to the attainment of organizational goal 5.3. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork
6. Context of Assessment	6.1. Competency assessment may occur in workplace or any appropriately simulated environment 6.2. Assessment shall be observed while task are being undertaken whether individually or in-group

UNIT OF COMPETENCY: DEVELOP AND PRACTICE NEGOTIATION SKILLS

UNIT CODE : 500311111

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes required to collect information in order to negotiate to a desired outcome and participate in the negotiation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Plan negotiations	1.1 Information on ***preparing for negotiation*** is identified and included in the plan 1.2 Information on creating ***nonverbal environments*** for positive negotiating is identified and included in the plan 1.3 Information on ***active listening*** is identified and included in the plan 1.4 Information on different ***questioning techniques*** is identified and included in the plan 1.5 Information is checked to ensure it is correct and up-to- date
2. Participate in negotiations	2.1 Criteria for successful outcome are agreed upon by all parties 2.2 Desired outcome of all parties are considered 2.3 Appropriate language is used throughout the negotiation 2.4 A variety of questioning techniques are used 2.5 The issues and processes are documented and agreed upon by all parties 2.6 Possible solutions are discussed and their viability assessed 2.7 Areas for agreement are confirmed and recorded 2.8 Follow-up action is agreed upon by all parties

RANGE OF VARIABLES

VARIABLE	RANGE
1. Preparing for negotiation	1.1 Background information on other parties to the negotiation 1.2 Good understanding of topic to be negotiated 1.3 Clear understanding of desired outcome/s 1.4 Personal attributes 1.4.1 self-awareness 1.4.2 self esteem 1.4.3 objectivity 1.4.4 empathy 1.4.5 respect for others 1.5 Interpersonal skills 1.5.1 listening/reflecting 1.5.2 nonverbal communication 1.5.3 assertiveness 1.5.4 behavior labeling 1.5.5 testing understanding 1.5.6 seeking information 1.5.7 self-disclosing 1.6 Analytic skills 1.6.1 observing differences between content and process 1.6.2 identifying bargaining information 1.6.3 applying strategies to manage process 1.6.4 applying steps in negotiating process 1.6.5 strategies to manage conflict 1.6.6 steps in negotiating process 1.6.7 options within organization and externally for resolving conflict
2. Non-verbal environments	2.1 Friendly reception 2.2 Warm and welcoming room 2.3 Refreshments offered 2.4 Lead in conversation before negotiation begins
3. Active listening	3.1 Attentive 3.2 Don't interrupt 3.3 Good posture 3.4 Maintain eye contact 3.5 Reflective listening
4. Questioning techniques	4.1 Direct 4.2 Indirect 4.3 Open-ended

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Demonstrated sufficient knowledge of the factors influencing negotiation to achieve agreed outcome 1.2 Participated in negotiation with at least one person to achieve an agreed outcome
2. Underpinning Knowledge and Attitude	2.1 Codes of practice and guidelines for the organization 2.2 Organizations policy and procedures for negotiations 2.3 Decision making and conflict resolution strategies procedures 2.4 Problem solving strategies on how to deal with unexpected questions and attitudes during negotiation 2.5 Flexibility 2.6 Empathy
3. Underpinning Skills	3.1 Interpersonal skills to develop rapport with other parties 3.2 Communication skills (verbal and listening) 3.3 Observation skills 3.1 Negotiation skills
4. Resource Implications	The following resources **MUST** be provided: 4.1 Room with facilities necessary for the negotiation process 4.2 Human resources (negotiators)
5. Methods of Assessment	Competency may be assessed through: 5.1 Observation/demonstration and questioning 5.2 Portfolio assessment 5.3 Oral and written questioning 5.4 Third party report
6. Context for Assessment	6.1 Competency to be assessed in real work environment or in a simulated workplace setting.

UNIT OF COMPETENCY: **SOLVE PROBLEMS RELATED TO WORK ACTIVITIES**

UNIT CODE : **500311112**

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to solve problems in the workplace including the application of problem solving techniques and to determine and resolve the root cause of problems.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Identify the problem	1.1. Variances are identified from normal operating parameters; and product quality 1.2. Extent, cause and nature are of the problem are defined through observation, investigation and ***analytical techniques*** 1.3. ***Problems*** are clearly stated and specified
2. Determine fundamental causes of the problem	2.1. Possible causes are identified based on experience and the use of problem solving tools / analytical techniques. 2.2. Possible cause statements are developed based on findings 2.3. Fundamental causes are identified per results of investigation conducted
3. Determine corrective action	3.1. All possible options are considered for resolution of the problem 3.2. Strengths and weaknesses of possible options are considered 3.3. Corrective actions are determined to resolve the problem and possible future causes 3.4. **Action *plans*** are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures
4. Provide recommendation/s to manager	4.1. Report on recommendations are prepared 4.2. Recommendations are presented to appropriate personnel. 4.3. Recommendations are followed-up, if required

RANGE OF VARIABLES

VARIABLE	RANGE
1. Analytical techniques	1.1. Brainstorming 1.2. Intuitions/Logic 1.3. Cause and effect diagrams 1.4. Pareto analysis 1.5. SWOT analysis 1.6. Gant chart, Pert CPM and graphs 1.7. Scatter grams
2. Problem	2.1. Non – routine process and quality problems 2.2. Equipment selection, availability and failure 2.3. Teamwork and work allocation problem 2.4. Safety and emergency situations and incidents
3. Action plans	3.1. Priority requirements 3.2. Measurable objectives 3.3. Resource requirements 3.4. Timelines 3.5. Co-ordination and feedback requirements 3.6. Safety requirements 3.7. Risk assessment 3.8. Environmental requirements

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Identified the problem 1.2. Determined the fundamental causes of the problem 1.3. Determined the correct / preventive action 1.4. Provided recommendation to manager These aspects may be best assessed using a range of scenarios / case studies / what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
2. Underpinning Knowledge	2.1. Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 2.2. Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 2.2.1. Relevant equipment and operational processes 2.2.2. Enterprise goals, targets and measures 2.2.3. Enterprise quality, OHS and environmental requirement 2.2.4. Principles of decision making strategies and techniques 2.2.5. Enterprise information systems and data collation 2.2.6. Industry codes and standards
3. Underpinning Skills	3.1. Using range of formal problem solving techniques 3.2. Identifying and clarifying the nature of the problem 3.3. Devising the best solution 3.4. Evaluating the solution 3.5. Implementation of a developed plan to rectify the problem

4. Resource Implications	4.1. Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios / case studies / what ifs will be required as well as bank of questions which will be used to probe the reason behind the observable action.
5. Methods of Assessment	Competency may be assessed through: 5.1. Case studies on solving problems in the workplace 5.2. Observation The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
6. Context of Assessment	6.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY: USE MATHEMATICAL CONCEPTS AND TECHNIQUES

UNIT CODE : 500311113

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required in the application of mathematical concepts and techniques.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Identify mathematical tools and techniques to solve problem	1.1 Problem areas are identified based on given condition 1.2 ***Mathematical techniques*** are selected based on the given problem
2. Apply mathematical procedure/solution	2.1 Mathematical techniques are applied based on the problem identified 2.2 Mathematical computations are performed to the level of accuracy required for the problem 2.3 Results of mathematical computation is determined and verified based on job requirements
3. Analyze results	3.1 Result of application is reviewed based on expected and required specifications and outcome 3.2 ***Appropriate action*** is applied in case of error

RANGE OF VARIABLES

VARIABLE	RANGE
1. Mathematical techniques	May include but are not limited to: 1.1 Four fundamental operations 1.2 Measurements 1.3 Use/Conversion of units of measurements 1.4 Use of standard formulas
2. Appropriate action	2.1 Review in the use of mathematical techniques (e.g. recalculation, re-modeling) 2.2 Report error to immediate superior for proper action

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified, applied and reviewed the use of mathematical concepts and techniques to workplace problems
2. Underpinning Knowledge	2.1 Fundamental operation (addition, subtraction, division, multiplication) 2.2 Measurement system 2.3 Precision and accuracy 2.4 Basic measuring tools/devices
3. Underpinning Skills	3.1 Applying mathematical computations 3.2 Using calculator 3.3 Using different measuring tools
4. Resource Implications	The following resources **MUST** be provided: 4.1 Calculator 4.2 Basic measuring tools 4.3 Case Problems
5. Methods of Assessment	Competency may be assessed through: 5.1 Authenticated portfolio 5.2 Written Test 5.3 Interview/Oral Questioning 5.4 Demonstration
6. Context of Assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY: USE RELEVANT TECHNOLOGIES

UNIT CODE : 500311114

UNIT DESCRIPTOR : This unit of competency covers the knowledge, skills, and attitude required in selecting, sourcing and applying appropriate and affordable technologies in the workplace.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Study/select appropriate technology	1.1 Usage of different ***technologies*** is determined based on job requirements 1.2 Appropriate technology is selected as per work specification
2. Apply relevant technology	2.1 Relevant technology is effectively used in carrying out function 2.2 Applicable software and hardware are used as per task requirement 2.3 ***Management concepts*** are observed and practiced as per established industry practices
3. Maintain/enhance relevant technology	3.1 Maintenance of technology is applied in accordance with the ***industry standard operating procedure***, ***manufacturer's operating guidelines*** and ***occupational health and safety procedure*** to ensure its operative ability 3.2 Updating of technology is maintained through continuing education or training in accordance with job requirement 3.3 Technology failure/ defect is immediately reported to the concern/responsible person or section for ***appropriate action***

RANGE OF VARIABLES

VARIABLE	RANGE
1. Technology	May include but are not limited to: 1.1 Office technology 1.2 Industrial technology 1.3 System technology 1.4 Information technology 1.5 Training technology
2. Management concepts	May include but not limited to: 2.1 Real Time Management 2.2 KAIZEN or continuous improvement 2.3 5s 2.4 Total Quality Management 2.5 Other management/productivity tools
3. Industry standard operating procedure	3.1 Written guidelines relative to the usage of office technology/equipment 3.2 Verbal advise/instruction from the co-worker
4. Manufacturer's operating guidelines/ instructions	4.1 Written instruction/manuals of specific technology/ equipment 4.2 General instruction manual 4.3 Verbal advise from manufacturer relative to the operation of equipment
5. Occupational health and safety procedure	5.1 Relevant statutes on OHS 5.2 Company guidelines in using technology/equipment
6. Appropriate action	6.1 Implementing preventive maintenance schedule 6.2 Coordinating with manufacturer's technician

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Studied and selected appropriate technology consistent with work requirements 1.2 Applied relevant technology 1.3 Maintained and enhanced operative ability of relevant technology
2. Underpinning Knowledge	2.1 Awareness on technology and its function 2.2 Repair and maintenance procedure 2.3 Operating instructions 2.4 Applicable software 2.5 Communication techniques 2.6 Health and safety procedure 2.7 Company policy in relation to relevant technology 2.8 Different management concepts 2.9 Technology adaptability
3. Underpinning Skills	3.1 Relevant technology application/implementation 3.2 Basic communication skills 3.3 Software applications skills 3.4 Basic troubleshooting skills
4. Resource Implications	The following resources **MUST** be provided: 4.1 Relevant technology 4.2 Interview and demonstration questionnaires 4.3 Assessment packages
5. Methods of Assessment	Competency must be assessed through: 5.1 Interview 5.2 Actual demonstration 5.3 Authenticated portfolio (related certificates of training/seminar)
6. Context of Assessment	6.1 Competency may be assessed in actual workplace or simulated environment

COMMON COMPETENCIES

UNIT TITLE : **APPLY QUALITY STANDARDS**

UNIT CODE : **506315202**

UNIT DESCRIPTOR : This unit covers the knowledge, skills, attitudes and values needed to apply quality standards in the workplace. The unit also includes the application of relevant safety procedures and regulations, organization procedures and customer requirements.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Assess quality of received materials	1.1. Work instruction is obtained and work is carried out in accordance with standard operating procedures. 1.2. Received ***materials*** are checked against workplace standards and specifications. 1.3. Faulty materials related to work are identified and isolated. 1.4. ***Faults*** and any identified causes are recorded and/or reported to the supervisor concerned in accordance with workplace procedures. 1.5. Faulty materials are replaced in accordance with workplace procedures.
2. Assess own work	2.1. ***Documentation*** relative to quality within the company is identified and used. 2.2. Completed work is checked against workplace standards relevant to the task undertaken. 2.3. ***Errors*** are identified and isolated. 2.4. Information on the quality and other indicators of production performance are recorded in accordance with workplace procedures. 2.5. In cases of deviations from specific ***quality standards***, causes are documented and reported in accordance with the workplace' s standards operating procedures.
3. Engage in quality improvement	3.1. Process improvement procedures are participated in relative to workplace assignment. 3.2. Work is carried out in accordance with process improvement procedures. 3.3. Performance of operation or quality of product of service to ensure ***customer*** satisfaction is monitored.

RANGE OF VARIABLES

VARIABLE	RANGE
1 Materials	1.1 Materials may include but not limited to: 1.1.1. Manuals 1.1.2. Job orders 1.1.3. Instructional videos
2 Faults	2.1 Faults may include but not limited to: 2.1.1. Materials not to specification 2.1.2. Materials contain incorrect/outdated information 2.1.3. Hardware defects 2.1.4. Materials that do not conform with any regulatory agencies
3 Documentation	3.1 Organization work procedures 3.2 Manufacturer's instruction manual 3.3 Customer requirements 3.4 Forms
4 Errors	4.1 Errors may be related but not limited to the following: 4.1.1. Deviation from the requirements of the Client 4.1.2. Deviation from the requirement of the organization
5 Quality standards	5.1 Quality standards may be related but not limited to the following: 5.1.1. Materials 5.1.2. Hardware 5.1.3. Final product 5.1.4. Production processes 5.1.5. Customer service
6 Customer	6.1 Co-worker 6.2 Supplier/Vendor 6.3 Client 6.4 Organization receiving the product or service

EVIDENCE GUIDE

1 Critical aspect of competency	Assessment must show that the candidate: 1.1 Carried out work in accordance with the company's standard operating procedures 1.2 Performed task according to specifications 1.3 Reported defects detected in accordance with standard operating procedures 1.4 Carried out work in accordance with the process improvement procedures
2 Underpinning knowledge	2.1 Relevant production processes, materials and products 2.2 Characteristics of materials, software and hardware used in production processes 2.3 Quality checking procedures 2.4 Workplace procedures 2.5 Safety and environmental aspects of production processes 2.6 Fault identification and reporting 2.7 Quality improvement processes
3 Underpinning skills	3.1 Reading skills required to interpret work instruction 3.2 Communication skills needed to interpret and apply defined work procedures 3.3 Carry out work in accordance with OHS policies and procedures 3.4 Critical thinking 3.5 Solution providing and decision-making
4 Method of assessment	The assessor must select two of the following to objectively evaluate the candidate: 4.1 Observation and oral questioning 4.2 Third party report 4.3 Portfolio 4.4 Practical demonstration
5 Resource implication	Materials, software and hardware to be used in a real or simulated situation
6 Context of Assessment	Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : **PERFORM COMPUTER OPERATIONS**

UNIT CODE : **506311203**

UNIT DESCRIPTOR : This unit covers the knowledge, skills, attitudes and values needed to perform computer operations which include inputting, accessing, producing and transferring data using the appropriate hardware and software.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Plan and prepare for task to be taken undertaken	1.1. Requirements of task are determined in accordance with the required output. 1.2. Appropriate ***hardware*** and ***software*** are selected according to task assigned and required outcome. 1.3. Task is planned to ensure that ***OH & S guidelines and*** procedures are followed. 1.4. Client -specific guidelines and procedures are followed. 1.5. Required data security guidelines are applied in accordance with existing procedures.
2. Input data into computer	2.1. Data are entered into the computer using appropriate program/application in accordance with company procedures. 2.2. Accuracy of information is checked and information is saved in accordance with standard operating procedures. 2.3. Inputted data is stored in ***storage media*** according to requirements. 2.4. Work is performed within ***ergonomic guidelines.***
3. Access information using computer	3.1. Correct program/application is selected based on job requirements. 3.2. Program/application containing the information required is accessed according to company procedures. 3.3. ***Desktop icons*** are correctly selected, opened and closed for navigation purposes. 3.4. Keyboard techniques are carried out in line with OH & S requirements for safe use of keyboards.

4. Produce output/ data using computer system	4.1. Entered data are processed using appropriate software commands. 4.2. Data are printed out as required using computer hardware /peripheral devices in accordance with standard operating procedures. 4.3. Files and data are transferred between compatible systems using computer software, hardware/peripheral devices in accordance with standard operating procedures.
5. Use basic functions of a www-browser to locate information	5.1. Information requirements for internet search are established. 5.2. Browser is launched. 5.3. Search engine is loaded. 5.4. Appropriate search criteria/or URL of site is entered. 5.5. Relevant links are followed to locate required information. 5.6. Useful pages are bookmarked or printed as required.
6. Maintain computer equipment and systems	6.1. Procedures for ensuring security of data, including regular back-ups and virus checks are implemented in accordance with standard operating procedures. 6.2. Basic file maintenance procedures are implemented in line with the standards operating procedures.

RANGE OF VARIABLES

VARIABLE	RANGE
1 Hardware and peripheral devices	1.1 Personal computers 1.2 Networked systems 1.3 Communication equipment 1.4 Printers 1.5 Scanners 1.6 Keyboard 1.7 Mouse 1.8 Voice/Data logger
2 Software	Software includes the following but not limited to: 2.1 Word processing packages 2.2 Database packages 2.3 Internet 2.4 Spreadsheets 2.5 Client Specific Software
3 OH & S guidelines	3.1 OHS guidelines 3.2 Enterprise procedures
4 Storage media	Storage media include the following but not limited to: 4.1 Diskettes 4.2 CDs 4.3 Zip disks 4.4 hard disk drives, local and remote 4.5 Optical drives
5 Ergonomic guidelines	5.1 Types of equipment used 5.2 Appropriate furniture 5.3 Seating posture 5.4 Lifting posture 5.5 Visual display unit screen brightness
6 Desktop icons	6.1 Icons include the following but not limited to: 6.2 Directories/folders 6.3 Files 6.4 Network devices 6.5 Recycle bin 6.6 Program icons
7 Maintenance	7.1 Creating and managing more space in the hard disk and other peripherals 7.2 Reviewing programs 7.3 Deleting unwanted files 7.4 Backing up files 7.5 Checking hard drive for errors 7.6 Using up to date anti-virus programs 7.7 Cleaning dust from internal and external surfaces

EVIDENCE GUIDE

1 Critical aspects of competency	Assessment must show that the candidate: 1.1 Selected and used hardware components correctly and according to the task requirement 1.2 used basic software applications to create new files and documents 1.3 Produced accurate and complete data in accordance with the requirements 1.4 Used appropriate devices and procedures to transfer files/data accurately 1.5 Used basic functions of a www-browser to locate information.
2 Underpinning knowledge	2.1 Basic ergonomics of keyboard and computer user 2.2 Main types of computers and basic features of different operating systems 2.3 Main parts of a computer 2.4 Storage devices and basic categories of memory 2.5 Relevant types of software 2.6 General security, privacy legislation and copyright 2.7 Viruses 2.8 OH & S principles and responsibilities 2.9 Calculating computer capacity 2.10 Productivity Application 2.11 Business Application 2.12 System Software
3 Underpinning skills	3.1 Reading and comprehension skills required to interpret work instruction and to interpret basic user manuals. 3.2 Communication skills to identify lines of communication, request advice, follow instructions and receive feedback. 3.3 Technology skills to use equipment safely including keyboard skills.
4 Method of assessment	The assessor may select two of the following assessment methods to objectively assess the candidate: 4.1 Direct Observation and Oral Questioning 4.2 Practical demonstration
5 Resource implication	5.1 Computer hardware with peripherals 5.2 Appropriate software
6 Context of Assessment	6.1 Assessment may be conducted in the workplace or in a simulated environment

CORE COMPETENCIES

UNIT OF COMPETENCY: PERFORM RELATIONAL DATABASE MANAGEMENT IN ORACLE DATABASE TECHNOLOGY

UNIT CODE : **ICT313361**

UNIT DESCRIPTOR : This unit introduces the fundamentals of SQL using Oracle Database technology. Specifically it teaches the concepts of relational databases and the SQL programming language. It teaches how to write queries against single and multiple tables, manipulate data in tables, and create database objects. It also teaches how to use single row functions to customize output, use conversion functions and conditional expressions.

This unit also focuses on how to effectively use SQL commands against business data. It teaches features that will help query and data manipulation within the database and also how to use the dictionary views to retrieve metadata and create reports about their schema objects. Further, it also teaches features on how to set user access level and usage of scalar and correlated sub-queries.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Retrieve Data Using the SQL SELECT Statement	1.1 Capabilities of SQL SELECT statements are listed in accordance with PL/SQL framework 1.2 Report of data from the output of a basic SELECT statement is generated in accordance with PL/SQL framework 1.3 Arithmetic expressions and NULL values are used in accordance with PL/SQL framework 1.4 Column aliases are implemented in accordance with PL/SQL framework 1.5 Concatenation operator, literal character strings, alternative quote operator, and the DISTINCT keyword are described in accordance with PL/SQL framework 1.6 ***Data*** is Sorted and Restricted in accordance with PL/SQL framework
2. Use Single-Row Functions to Customize Output	2.1 Single row and multiple row functions are differentiated in accordance with PL/SQL framework 2.2 Strings using character functions are manipulated in accordance with PL/SQL framework 2.3 Numbers with the ROUND, TRUNC, and MOD functions are manipulated in accordance with PL/SQL framework 2.4 Arithmetic with date data are performed in accordance with PL/SQL framework 2.5 Dates with the DATE functions are manipulated in accordance with PL/SQL framework 2.6 ***Functions and Conditional Expressions*** are converted in accordance with PL/SQL framework

3. Display Data From Multiple Tables Using Joins	3.1 SELECT statements to access data from more than one table are written in accordance with PL/SQL framework 3.2 Tables Using SQL:1999 Syntax are joined in accordance with PL/SQL framework 3.3 Data that does not meet a join condition by using outer joins are viewed in accordance with PL/SQL framework 3.5 Cross Joins are created in accordance with PL/SQL framework
4. Manipulate Data	4.1 New Rows to a Table are added in accordance with PL/SQL framework 4.2 Data in a Table are changed in accordance with PL/SQL framework 4.3 DELETE and TRUNCATE Statements are used in accordance with PL/SQL framework 4.4 COMMIT and ROLLBACK statements are saved in accordance with PL/SQL framework 4.5 Read Consistency is implemented in accordance with PL/SQL framework 4.6 FOR UPDATE Clause is described in accordance with PL/SQL framework 4.7 ***DDL Statements to Create and Manage Tables*** are used in accordance with PL/SQL framework
5. Control User Access	5.1 System and Object Privileges are identified in accordance with PL/SQL framework 5.2 Users are created in accordance with PL/SQL framework 5.3 System Privileges are granted in accordance with PL/SQL framework 5.4 Privileges to a Role are created and granted in accordance with PL/SQL framework 5.5 Object Privileges are granted in accordance with PL/SQL framework 5.6 Privileges are passed in accordance with PL/SQL framework 5.7 Object Privileges are revoked in accordance with PL/SQL framework 5.8 ***Schema Objects*** are managed in accordance with PL/SQL framework 5.9 ***Objects with Data Dictionary Views*** are managed in accordance with PL/SQL framework
6. Manipulate Large Data Sets	6.1 Subqueries to Manipulate Data are used in accordance with PL/SQL framework 6.3 Data Using a Subquery as Source are retrieved in accordance with PL/SQL framework 6.4 Data Using a Subquery as a Target are inserted in accordance with PL/SQL framework 6.5 The WITH CHECK OPTION Keyword on DML Statements are used in accordance with PL/SQL framework 6.6 The types of Multitable INSERT Statements are listed in accordance with PL/SQL framework 6.7 Multitable INSERT Statements are identified in accordance with PL/SQL framework

7. Manage Data in Different Time Zones	7.1 Date and Time in a Session's Time Zone are compared in accordance with PL/SQL framework 7.2 DBTIMEZONE and SESSIONTIMEZONE are described in accordance with PL/SQL framework 7.3 The differences between DATE and TIMESTAMP are listed in accordance with PL/SQL framework 7.4 The INTERVAL Data Types are identified in accordance with PL/SQL framework 7.5 EXTRACT, TZ_OFFSET and FROM_TZ functions are used in accordance with PL/SQL framework 7.6 TO_TIMESTAMP, TO_YMINTERVAL, and TO_DSINTERVAL are used in accordance with PL/SQL framework
8. Retrieve Data Using Subqueries	8.1 Pairwise and Nonpairwise are compared in accordance with PL/SQL framework 8.2 Scalar Subquery Expressions are used in accordance with PL/SQL framework 8.3 Problems with Correlated Subqueries are solved in accordance with PL/SQL framework 8.4 Correlated Subqueries are updated and deleted in accordance with PL/SQL framework 8.5 The EXISTS and NOT EXISTS operators are used in accordance with PL/SQL framework 8.6 The WITH clause is used in accordance with PL/SQL framework 8.7 The Recursive WITH clause is used in accordance with PL/SQL framework

RANGE OF VARIABLES:

VARIABLE	RANGE
1. Data restriction and Sorting	• Write queries with a WHERE clause to limit the output retrieved • Use the comparison operators and logical operators • Identify the rules of precedence for comparison and logical operators • Usage of character string literals in the WHERE clause • Write queries with an ORDER BY clause • Sort output in descending and ascending order
2. Conversion Functions and Conditional Expressions	• Describe implicit and explicit data type conversion • Describe TO_CHAR, TO_NUMBER, and TO_DATE conversion functions • Nesting multiple functions • Apply the NVL, NULLIF, and COALESCE functions to data • Use conditional IF THEN ELSE logic
3. DDL Statements to Create and Manage Tables	• Categorize Database Objects • Create Tables using the CREATE TABLE Statement • Identify the data types • Describe Constraints • Create a table using a subquery • How to alter a table? • Drop a table
4. Schema Objects	• Add, Modify, and Drop a Column • Add, Drop, and Defer a Constraint • Enable and Disable a Constraint • Create and Remove Indexes • Create a Function-Based Index • Perform Flashback Operations • Create an External Table by Using ORACLE_LOADER and by Using ORACLE_DATAPUMP • Query External Tables
5. Objects with Data Dictionary Views	• USER_OBJECTS and ALL_OBJECTS Views • View Table and Column Information • Query the dictionary views for constraint information • Query the dictionary views for view, sequence, index and synonym information • Add a comment to a table • Query the dictionary views for comment information

EVIDENCE GUIDE

1.Critical aspect of competency	Assessment requires evidence that the candidate: 1.1 Displayed data from multiple tables using the ANSI SQL 99 JOIN syntax. 1.2 Employed SQL functions to generate customized data. 1.3 Created reports of aggregated data. 1.4 Controlled privileges at the object and system level. 1.5 Created indexes, constraints and alter existing schema objects. 1.6 Created and query external tables and use the advanced features of SQL to query and manipulate data within the database. 1.7 Used the dictionary views to retrieve metadata and create reports about their schema objects.
2. Underpinning Knowledge	2.1 Use single row functions to customize output, use conversion functions and conditional expressions. 2.2 The usage of group functions to report aggregated data is also dealt with. Demonstrations and hands-on 2.3 Familiarity with data processing concepts and techniques 2.4 Data processing 2.6 SQL concepts, syntax and flavors 2.7 RDBMS concepts 2.8 Control database access to specific objects. 2.9 Manage schema objects. 2.10 Manipulate large data sets in the Oracle database by using subqueries. 2.11 Manage data in different time zones. 2.12 Retrieve data by using advanced subqueries. 2.13 Use the regular expression support in SQL to search, match, and replace strings in terms of regular expressions
3. Underpinning skills	3.1 Basic computer operation skills 3.2 Logic analysis 3.3 Communication skills 3.4 Code writing and debugging skills
4. Method of assessment	The assessor will assess candidate with- 4.1 Portfolio • Result of Oracle Vendor Examinations • Sample codes 4.2 Interview
5.Resource implication	5.1 Computer hardware with peripherals 5.2 Appropriate software 5.3 Access to internet 5.4 Conducive testing environment
6.Context of assessment	Assessment may take place in an accredited Oracle testing center

UNIT OF COMPETENCY: USE AND APPLY PL/SQL PROGRAMMING LANGUAGE

UNIT CODE : ICT313363

UNIT DESCRIPTION : This unit introduces the student to PL/SQL language and explains the benefits of this programming language. The student will learn to develop stored procedures, functions, packages and other basic functions.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Declare PL/SQL Identifiers	1.1 PL/SQL language is ***introduced*** in accordance with PL/SQL framework 1.2 List the different Types of Identifiers in a PL/SQL subprogram in accordance with PL/SQL framework 1.3 Declarative Section to Define Identifiers are used in accordance with PL/SQL framework 1.4 Variables to store data are used in accordance with PL/SQL framework 1.5 Scalar Data Types are identified in accordance with PL/SQL framework 1.6 Sequences in PL/SQL Expressions are used in accordance with PL/SQL framework 1.7 ***Executable Statements*** are written in accordance with PL/SQL framework
2. Apply Interaction with the Oracle Server	2.1 SELECT Statements in PL/SQL are invoked in accordance with PL/SQL framework 2.2 Data in PL/SQL are retrieved in accordance with PL/SQL framework 2.3 Errors by using Naming Conventions when using Retrieval and DML Statements are avoided in accordance with PL/SQL framework 2.4 Data in the Server using PL/SQL is manipulated in accordance with PL/SQL framework 2.5 SQL Cursor Attributes to Obtain Feedback on DML are used in accordance with PL/SQL framework
3. Apply Exception Handling	3.1 Exceptions are understood in accordance with PL/SQL framework 3.2 Exceptions with PL/SQL are handled in accordance with PL/SQL framework 3.3 Predefined Oracle Server Errors are trapped in accordance with PL/SQL framework 3.4 Non-Predefined Oracle Server Errors are trapped in accordance with PL/SQL framework 3.5 User-Defined Exceptions are trapped in accordance with PL/SQL framework 3.6 Exceptions are propagated in accordance with PL/SQL framework

4. Store Procedures	4.1 Modularized and Layered Subprogram Design are created in accordance with PL/SQL framework 4.2 Development With PL/SQL Blocks are modularized in accordance with PL/SQL framework 4.3 PL/SQL Execution Environment are understood in accordance with PL/SQL framework 4.4 Benefits of using PL/SQL Subprograms are listed in accordance with PL/SQL framework 4.5 Differences between Anonymous Blocks and Subprograms are listed in accordance with PL/SQL framework 4.6 Procedures Parameters and Parameters Modes are implemented in accordance with PL/SQL framework 4.7 Procedure Information is viewed in accordance with PL/SQL framework

RANGE OF VARIABLES

VARIABLE	RANGE
1. PL/SQL language is introduced	• Overview of PL/SQL • Identify the benefits of PL/SQL Subprograms • Overview of the types of PL/SQL blocks • Create a Simple Anonymous Block • How to generate output from a PL/SQL Block
2. Executable Statements	• Describe Basic PL/SQL Block Syntax Guidelines • Learn to Comment the Code • Deployment of SQL Functions in PL/SQL • How to convert Data Types? • Describe Nested Blocks • Identify the Operators in PL/SQL

EVIDENCE GUIDE

1. Critical Aspect of Competency	1.1 Created and debug stored procedures and functions 1.2 Used conditional compilation to customize the functionality in a PL/SQL application without removing any source code 1.3 Designed PL/SQL packages to group related constructs 1.4 Created overloaded package subprograms for more flexibility 1.5 Designed PL/SQL anonymous blocks that execute efficiently
2. Underpinning Knowledge	2.1 Conditionally control code flow (loops, control structures). 2.2 Use PL/SQL packages to group and contain related constructs. 2.3 Generate triggers to solve business challenges. 2.4 Create anonymous PL/SQL blocks, as well as stored procedures and functions. 2.5 Use some of the Oracle supplied PL/SQL packages to generate screen output and file output. 2.7 Create anonymous PL/SQL blocks, functions and procedures.
3. Underpinning Skills	3.1 Basic computer operation skills 3.2 Logic analysis 3.3 Communication skills 3.4 Code writing and debugging skills
4. Method of Assessment	The assessor will assess candidate with- 4.1 Portfolio • Result of Oracle Vendor Examinations • Sample codes 4.2 Interview
5. Resource Implication	5.1 Computer hardware with peripherals 5.2 Appropriate software 5.3 Access to internet 5.4 Conducive testing environment
6. Context of Assessment	Assessment may take place in an accredited Oracle testing center

UNIT OF COMPETENCY: DESIGN AND TUNE PL/SQL LANGUAGE

UNIT CODE : ICT313364

UNIT DESCRIPTOR : This unit covers the advanced features of PL/SQL to design and tune PL/SQL. It also covers how to manage PL/SQL to interface with the database and other applications in the most efficient manner

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1 Design PL/SQL Code	1.1 Predefined data types are described in accordance with PL/SQL framework 1.2 Subtypes based on existing types for an application are created in accordance with PL/SQL framework 1.3 Different guidelines for cursor design are listed in accordance with PL/SQL framework 1.4 ***Collections*** *are used* in accordance with PL/SQL framework 1.5 ***Manipulating Large Objects*** are manipulated in accordance with PL/SQL framework
2. Use Advanced Interface Methods	2.1 External Procedures from PL/SQL are called in accordance with PL/SQL framework 2.2 Benefits of External Procedures are listed in accordance with PL/SQL framework 2.3 C advanced interface methods are shown in accordance with PL/SQL framework 2.4 Java advanced interface methods are shown in accordance with PL/SQL framework
3. Apply Performance and Tuning to PL/SQL code	3.1 The compiler is understood and influenced in accordance with PL/SQL framework 3.2 PL/SQL code is tuned in accordance with PL/SQL framework 3.3 Intra unit in-lining is enabled in accordance with PL/SQL framework 3.4 Memory issues are identified and tuned in accordance with PL/SQL framework 3.5 Network issues are recognized in accordance with PL/SQL framework 3.6 ***Performance with Caching*** is improved in accordance with PL/SQL framework

4. Implement virtual private database (VPD) with Fine-Grained Access Control	4.1 How fine-grained access control works overall is understood in accordance with PL/SQL framework 4.2 Features of fine-grained access control are described in accordance with PL/SQL framework 4.3 An application context is described in accordance with PL/SQL framework 4.4 An application context is created in accordance with PL/SQL framework 4.5 An application context is set in accordance with PL/SQL framework 4.6 The DBMS_RLS procedures are listed in accordance with PL/SQL framework 4.7 A policy is implemented in accordance with PL/SQL framework 4.8 Dictionary views holding information on fine-grained access are queried in accordance with PL/SQL framework

RANGE OF VARIABLES

VARIABLE	RANGE
1. Collections are used	• Overview of collections • Use Associative arrays • Use Nested tables • Use VARRAYs • Compare nested tables and VARRAYs • Write PL/SQL programs that use collections Use Collections effectively
2. Manipulating Large Objects	• Describe a LOB object • Use BFILEs • Use DBMS_LOB.READ and DBMS_LOB.WRITE to manipulate LOBs • Create a temporary LOB programmatically with the DBMS_LOB package • Use SecureFile LOBs to store documents • Convert BasicFile LOBs to SecureFile LOB format • Enable reduplication and compression
3. Performance and Tuning	• Understand and influence the compiler • Tune PL/SQL code • Enable intra unit inlining • Identify and tune memory issues • Recognize network issues

EVIDENCE GUIDE

1. Critical Aspect of Competency	Assessment requires evidence that the candidate: 1.1 Designed PL/SQL packages and program units that execute efficiently 1.2 Wrote code to interface with external applications and the operating system 1.3 Created PL/SQL applications that use collections 1.4 Wrote and tuned PL/SQL code effectively to maximize performance 1.5 Implemented virtual private database with fine-grained access control
2.Underpinning Knowledge	2.1 PL/SQL designing best practices. 2.2 Create PL/SQL applications that use collections. 2.3 Implement a virtual private database with fine-grained access control. 2.4 Write code to interface with external C and Java applications. 2.5 Write code to interface with large objects and use SecureFile LOBs. 2.6 Write and tune PL/SQL code effectively to maximize performance
3.Underpinning Skills	3.1 Basic computer operation skills 3.2 Logic analysis 3.3 Communication skills 3.4 Code writing and debugging skills
4.Method of Assessment	The assessor will assess candidate with- 4.1 Portfolio • Result of Oracle Vendor Examinations • Sample codes 4.2 Interview
5.Resource Implication	• Computer hardware with peripherals • Appropriate software • Access to internet • Conducive testing environment
6.Context of Assessment	Assessment may take place in an accredited Oracle testing center

SECTION 3 TRAINING STANDARDS

These guidelines are set to provide the Technical and Vocational Education and Training (TVET) providers with information and other important requirements to consider when designing training programs for **Programming (Oracle Database) NC III**.

3.1 CURRICULUM DESIGN

Course Title: Programming (Oracle Database) **NC Level:** NC III

Nominal Training Duration:
64 hrs – Basic Competencies
16 hrs – Common Competencies
160 hrs – Core Competencies
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240 hours

Course Description:

This course is designed to develop & enhance the knowledge, skills, & attitudes of a programmer in accordance with industry standards. It covers the basic, common & core competencies on programming language, specifically Oracle Database. The nominal duration of **240** hours covers the required units at Programming (Oracle Database) NC III. TVET providers can however, offer a longer, ladderized course covering the basic, common and core plus specialized competency unit/s.

BASIC COMPETENCIES
64 hrs

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Lead workplace communication	1.1 Communicate information about workplace processes. 1.2 Lead workplace discussions. 1.3 Identify and communicate issues arising in the workplace	• Group discussion • Role Play • Brainstorming	• Observation • Interviews
2. Lead small teams	2.1 Provide team leadership. 2.2 Assign responsibilities among members. 2.3 Set performance expectation for team members. 2.4 Supervise team performance	• Lecture • Demonstration • Self-paced (modular)	• Demonstration • Case studies

3. Develop and practice negotiation skills	3.1 Identify relevant information in planning negotiations 3.2 Participate in negotiations 3.3 Document areas for agreement	• Direct observation • Simulation/role playing • Case studies	• Written test • Practical/ performance test
4. Solve workplace problem related to work activities	4.1 Explain the analytical techniques. 4.2 Identify the problem. 4.3 Determine the possible cause/s of the problem.	• Direct observation • Simulation/role playing • Case studies	• Written test • Practical/ performance test
5. Use mathematical concepts and techniques	5.1 Identify mathematical tools and techniques to solve problem 5.2 Apply mathematical procedures/solution 5.3 Analyze results	• Direct observation • Simulation/role playing • Case studies	• Written test • Practical/ performance test
6. Use relevant technologies	6.1 Identify appropriate technology 6.2 Apply relevant technology 6.3 Maintain/enhance relevant technology	• Direct observation • Simulation/role playing • Case studies	• Written test • Practical/ performance test

COMMON COMPETENCIES

16 hrs.

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Apply Quality Standards	1.1 Asses quality of received materials 1.2 Assess own work 1.3 Engage in quality improvement	▪ Field trip ▪ Symposium ▪ Film showing ▪ Simulation ▪ On the job training	▪ Demonstration & questioning ▪ Observation & questioning ▪ Third party report
2. Operate a Personal Computer	2.1 Plan and prepare for task to be undertaken 2.2 Input data into computer 2.3 Access information using computer 2.4 Produce output/data using computer system 2.5 Use basic functions of a web browser to locate information 2.6 Maintain computer equipment and systems	• Modular • Film showing • Computer based training (e-learning) • Project method • On the job training	• Demonstration & questioning • Observation & questioning • Third party report • Assessment of output product • Portfolio • Computer- based assessment

CORE COMPETENCIES

160 hrs.

Unit of Competency	Learning Outcome	Methodology	Assessment Approach
1. Perform relational database management in Oracle database technology	1.1 Retrieve Data Using the SQL SELECT Statement 1.2 Use Single-Row Functions to Customize Output 1.3 Display Data From Multiple Tables Using Joins 1.4 Manipulate Data 1.5 Control User Access 1.6 Manipulate Large Data Sets 1.7 Manage Data in Different Time Zones 1.8 Retrieve Data Using Sub-queries	• Lecture/ Discussion • Hands on • Exercises • Demonstration	• Practical exam • Interviews/ questioning
2. Use and apply PL/SQL Programming Language	2.1 Declare PL/SQL Identifiers 2.2 Apply Interaction with the Oracle Server 2.3 Apply Exception Handling 2.4 Store Procedures	• Lecture/ Discussion • Hands on • Exercises • Demonstration	• Practical exam • Interviews/ questioning
3. Design and tune PL/SQL Language	3.1 Design PL/SQL Code 3.2 Use advanced interface methods 3.3 Apply performance and tuning to PL/SQL code 3.4 Implement virtual private database with fine-gained access control	• Lecture/ Discussion • Hands on • Exercises • Demonstration	• Practical exam • Interviews/ questioning

3.1. TRAINING DELIVERY

The delivery of training should adhere to the design of the curriculum. Delivery should be guided by the 10 basic principles of the competency-based TVET.

- The training is based on curriculum developed from the competency standards;
- Learning is modular in its structure;
- Training delivery is individualized and self-paced;
- Training is based on work that must be performed;
- Training materials are directly related to the competency standards and the curriculum modules;
- Assessment is based in the collection of evidence of the performance of work to the industry required standard;
- Training is based both on and off-the-job components;
- Allows for recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit; and
- Approved training programs are nationally accredited.

The competency-based TVET system recognizes various types of delivery modes, both on and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities may be adopted when designing training programs:

- The dualized mode of training delivery is preferred and recommended. Thus programs would contain both in-school and in-industry training or fieldwork components. Details can be referred to the Dual Training System (DTS) Implementing Rules and Regulations.
- Modular/self-paced learning is a competency-based training modality wherein the trainee is allowed to progress at his own pace. The trainer facilities the training delivery.
- Peer teaching/mentoring is a training modality wherein fast learners are given the opportunity to assist the slow learners.
- Supervised industry training or on-the-job training is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire a specific competencies prescribed in the training regulations.
- Distance learning is a formal education process in which majority of the instruction occurs when the students and instructors are not in the same place. Distance learning may employ correspondence study, or audio, video or computer technologies.

3.2. TRAINEE ENTRY REQUIREMENTS

Trainees or students should possess the following requirements:

- Must have completed at least 10 yrs. basic education or an ALS grade 10 certificate of rating holder Must have completed at least 10 yrs. basic education or an ALS grade 10 certificate of rating holder
- can communicate either oral or written;
- with basic computer skills

This list does not include specific institutional requirements such as educational attainment, appropriate work experience, and others that may be required of the trainees by the school or training center delivering the TVET program.

3.3. LIST OF TOOLS, EQUIPMENT AND MATERIALS

Recommended list of tools, equipment and materials for the conduct of training in **Programming (Oracle Database) NC III**

TOOLS		EQUIPMENT		MATERIALS	
Qty	**Description**	**Qty**	**Description**	**Qty**	**Description**
	Computer Software e.g. *- IDE* *- Libraries*		Network Computer with peripherals		Learning materials/ guide
			Server		Practice materials
			Printer		Hand-outs
			White board		Reference books
	Internet access		LCD Projector and screen		
	Application servers e.g. - database - web		Ergonomic computer tables and chairs		

The quantity of tools and equipment to be used for the conduct of training for this qualification shall depend on the number of students, size of the class, and/or modality of training. The most important consideration is to make sure that tools and equipment are adequately provided to all trainees when needed. The actual list of tools, equipment, machines, supplies and other materials to be used shall be identified and detailed in the Competency Based Curriculum (CBC) to be submitted by the TVET provider when registering a course or training program with TESDA.

Due to the fast-changing nature of the Information and Communications Technology (ICT) sector, TVET providers are reminded to use and provide their trainees with the latest technology tools, equipment and materials where appropriate and applicable.

In cases where there are specialized tools, equipment and facilities that are not generally considered standard requirements or not absolute requisites for training, the industry working group or TESDA may provide guidelines or specific advice on such matters.

3.4. TRAINING FACILITIES

The Programming workshop must be of concrete structure. Based on class size of 25 student/trainees the space requirements for the teaching/learning and circulation areas are as follows:

TEACHING/LEARNING AREAS	SIZE IN METERS	AREA IN SQ. METERS	QTY	TOTAL AREA IN SQ. METERS
Lecture Area	5 x 8	40	1	40
Computer laboratory	6 x 8	48	1	48
Learning Resource Area	4 x 5	20	1	20
Wash ,Toilet & Locker Room	2 x 5	10	2	20
Total				128
Facilities / Equipment / Circulation**				38
Total Area				**166**

***** Area requirement is equivalent to 30% of the total teaching/learning areas***

Note: The training center must be accredited by Oracle Philippines and must be a member of the Workforce Development Program.

3.5. TRAINERS QUALIFICATION

Programming (Oracle Database) NC III

- Must be Oracle Certified Professional PL/SQL Programmer
- Must be certified and approved by Oracle University Philippines
- Must be a holder of National TVET Trainer's Certificate (NTTC) Level 1

3.6. INSTITUTIONAL ASSESSMENT

Institutional Assessment is undertaken by trainees to determine their achievement of units of competency. A certificate of achievement is issued for each unit of competency. The institutional assessment is administered by the trainer/assessor.

The result of the institutional assessment may be considered as an evidence for national assessment.

SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1 To attain the National Qualification of **Programming (Oracle Database) NC III**, the candidate must demonstrate competency in all the units listed in Section 1. Successful candidates shall be awarded a **National Certificate III level** signed by the TESDA Director General.

4.2 The qualification of Programming (Oracle Database) NC III may be attained by passing the following exams:

4.2.1. Certification Exam 1 – Oracle Database Certified SQL Expert 1Z0-047 which will assess the following unit of competencies:

- Perform relational database management in Oracle database technology

4.2.2. Certification Exam 2 – Oracle PL/SQL Developer Certified Associate – 1Z0 – 147 which will assess the following unit of competency:

- Use and apply PL/SQL Programming Language

4.2.3. Certification Exam 3 – Oracle Advanced PL/SQL Developer Certified Professional – 1ZO – 146 which will assess the following unit of competency:

- Design and tune PL/SQL Language

Upon accumulation and submission of Certification Exams 1, 2 and 3, an individual shall be issued the corresponding **National Certificate.**

4.3 Assessment shall focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.

4.4 The following are qualified to apply for assessment and certification:

4.4.1. Graduate of formal, non-formal, and informal, including enterprise-based, training programs.

4.4.2. Experienced workers (wage employed or self-employed)

4.5 The guidelines on assessment and certification are discussed in detail in the "Procedures Manual on Assessment and Certification" and "Guidelines on the Implementation of the Philippine TVET Qualification and Certification System (PTQCS)".

COMPETENCY MAP – INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) SECTOR

BASIC COMPETENCIES

Receive and Respond to workplace communication	Work with Others	Demonstrate Work Values	Participate in Workplace Communication	Work in a Team Environment	Practice Career Professionalism	Practice occupational Health and Safety Procedures
Practice Housekeeping Procedures (5S)	**Lead Workplace Communication**	**Lead Small Team**	**Develop and Practice Negotiation Skills**	**Solve Problems Related to Work Activities**	**Use Mathematical Concepts and Techniques**	**Use Relevant Technologies**
Utilize Specialized Communication skills	Develop Team and Individual	Apply Problem Solving Techniques in the Workplace	Collect, Analyze and Organize Information	Plan and Organize Work	Promote Environmental Protection	

COMMON COMPETENCIES

Perform Computer Operation	**Apply Quality Standards**

Programming (Oracle Database) NC III

CORE COMPETENCIES

Communicate Effectively using the English Language	Deliver Quality Customer Service	Communicate Effectively in a Customer Contact Center	Utilize Enterprise/ Company Technology	Conduct Contact Center Campaign	Provide Specialized Support and Assistance to Customers	Manage the Activities of a Contact Center Work Team
Demonstrate Understanding and Knowledge of the American Culture and Geography	Perform Basic Computer Operation and Internet Navigation	Lead a Contact Center Work Team	Use Business Technology	Use Medical Terminology to Carry Out Task	Produce Text from Audio Transcription	Produce Cleaned-up and In-betweened Drawings
Review / Edit Documents	Manage the Activities of a Work Team	Lead a Team in Delivering Quality Service	Produce Over-all Designs for Animation	Create 2D Models and Images	Produce 2D Colored Animation	Produce Key Drawings for Animation
Produce Background Designs	Composit and Edit Animation Sequence	Produce Storyboard for Animation	Create 3D Models and Images	Coordinate the Production of Animation	Use email and search the web using browsers	Install Computer Systems and Networks
Configure Computer Systems and Networks	Diagnose and Troubleshoot Computer Systems and Networks	Maintain Computer Systems and Networks	Operate a word-processing application	Operate a spreadsheet application	Operate a presentation package	Install and maintain a server
Design program logic	Apply program development approach	Apply object-oriented program language skills	Apply programming skills in a second language	Install network hardware to a network	Install software to networked computers	Install and configure a network
Determine and confirm client business expectations and needs	Create a simple mark-up language document to specification	Design a website to meet technical requirements	Transfer content to a website using commercial packages	Determine and apply appropriate development methodologies	Ensure website content meets technical protocols and standards	Build a database
Use structured query language to create database structures & manipulate data	Develop detailed technical design	Act on and complete change requests	Determine and act on client computing problems	Provide one -to - one instruction	Provide first-level remote help desk support	Design pages using a page layout application
Develop design studies	Create vector graphics using a graphics application	Create raster graphics using a graphics application	Develop designs for print media	Develop designs for electronic media	Develop designs for product packaging	Design booth & product/window display
Design program logic	Plan development of application features	Apply .Net programming skills	Develop Windows forms application	Develop web application	Develop service oriented applications	Develop applications using COBOL or similar language
Develop command-line/ console and desktop applications using Java technology	Develop enterprise/web applications using Java technology	**Perform relational database management in Oracle database technology**	**Use and apply PL/SQL programming language**	**Design and Tune PL/SQL language**	Perform object-oriented analysis and design in Java technology	Create and fine-tune Java technology applications using object-oriented programming concept

DEFINITION OF TERMS

GENERAL

1) **Certification -** is the process of verifying and validating the competencies of a person through assessment

2) **Certificate of Competency (COC)** – is a certification issued to individuals who pass the assessment for a single unit or cluster of units of competency

3) **Common Competencies** - are the skills and knowledge needed by all people working in a particular industry

4) **Competency** - is the possession and application of knowledge, skills and attitudes to perform work activities to the standard expected in the workplace

5) **Competency Assessment -** is the process of collecting evidence and making judgments on whether competency has been achieved

6) **Competency Standard (CS)** - is the industry-determined specification of competencies required for effective work performance

7) **Context of Assessment** - refers to the place where assessment is to be conducted or carried out

8) **Core Competencies - are** the specific skills and knowledge needed in a particular area of work - industry sector/occupation/job role

9) **Critical aspects of competency -** refers to the evidence that is essential for successful performance of the unit of competency

10) **Elective Competencies -** are the additional skills and knowledge required by the individual or enterprise for work

11**) Elements** - are the building blocks of a unit of competency. They describe in outcome terms the functions that a person perform in the workplace

12) **Evidence Guide** - is a component of the unit of competency that defines or identifies the evidences required to determine the competence of the individual. It provides information on critical aspects of competency, underpinning knowledge, underpinning skills, resource implications, assessment method and context of assessment

13) **Level -** refers to the category of skills and knowledge required to do a job

14) **Method of Assessment** - refers to the ways of collecting evidence and when evidence should be collected

15) **National Certificate (NC)** – is a certification issued to individuals who achieve all the required units of competency for a national qualification defined under the Training Regulations. NCs are aligned to specific levels within the PTQF

16) **Performance Criteria** - are evaluative statements that specify what is to be assessed and the required level of performance

17) **Qualification** - is a cluster of units of competencies that meets job roles and is significant in the workplace. It is also a certification awarded to a person on successful completion of a course in recognition of having demonstrated competencies in an industry sector

18) **Range of Variables** - describes the circumstances or context in which the work is to be performed

19) **Recognition of Prior Learning (RPL)** – is the acknowledgement of an individual's skills, knowledge and attitudes gained from life and work experiences outside registered training programs

20) **Resource Implications -** refers to the resources needed for the successful performance of the work activity described in the unit of competency. It includes work environment and conditions, materials, tools and equipment

21) **Basic Competencies -** are the skills and knowledge that everyone needs for work

22) **Training Regulations (TR)** – refers to the document promulgated and issued by TESDA consisting of competency standards, national qualifications and training guidelines for specific sectors/occupations. The TR serves as basis for establishment of qualification and certification under the PTQF. It also serves as guide for development of competency-based curricula and instructional materials including registration of TVET programs offered by TVET providers

23) **Underpinning Knowledge -** refers to the competency that involves in applying knowledge to perform work activities. It includes specific knowledge that is essential to the performance of the competency

24) **Underpinning Skills** - refers to the list of the skills needed to achieve the elements and performance criteria in the unit of competency. It includes generic and industry specific skills

25) **Unit of Competency** – is a component of the competency standards stating a specific key function or role in a particular job or occupation; it is the smallest component of achievement that can be assessed and certified under the PTQF

SECTOR SPECIFIC

1. **ADO.NET** - is a set of computer software components that programmers can use to access data and data services. It is a part of the base class library that is included with the Microsoft .NET Framework. It is commonly used by programmers to access and modify data stored in relational database systems, though it can also access data in non-relational sources. ADO.NET is sometimes considered an evolution of ActiveX Data Objects (ADO) technology, but was changed so extensively that it can be considered an entirely new product.
2. **ASP.NET** - is a web application framework developed and marketed by Microsoft to allow programmers to build dynamic web sites, web applications and web services. ASP.NET is built on the Common Language Runtime (CLR), allowing programmers to write ASP.NET code using any supported .NET language.
3. **Algorithm** - is a type of effective method in which a list of well-defined instructions for completing a task will, when given an initial state, proceed through a well-defined series of successive states, eventually terminating in an end-state. The transition from one state to the next is not necessarily deterministic; some algorithms, known as probabilistic algorithms, incorporate randomness.
4. **Artificial intelligence programmer** - develops the logic the game uses to carry out a large number of actions. An AI programmer may program pathfinding, strategy and enemy tactic systems. This is one of the most challenging aspects of game programming and its sophistication is developing rapidly.

5. **Browser** – a software package that provides the user interface for accessing Internet, intranet and extranet Web sites.
6. **COBOL** - is one of the oldest programming languages. Its name is an acronym for **CO**mmon **B**usiness-**O**riented **L**anguage, defining its primary domain in business, finance, and administrative systems for companies and governments.
7. **Compiler** - is a computer program (or set of programs) that transforms source code written in a programming language (the source language) into another computer language (the target language, often having a binary form known as object code). The most common reason for wanting to transform source code is to create an executable program.
8. **Computer** – a device that has the ability to accept data; internally store and execute a program of instructions; perform mathematical, logical, and manipulative operations on data; and report the results.
9. **Computer program** - also a software program, or just a program, is a sequence of instructions written to perform a specified task for a computer. A computer requires programs to function, typically executing the program's instructions in a central processor. The program has an executable form that the computer can use directly to execute the instructions. The same program in its human-readable source code form, from which executable programs are derived (e.g., compiled), enables a programmer to study and develop its algorithms.
10. **Computer programming** - is the iterative process of writing or editing source code. Editing source code involves testing, analyzing, and refining, and sometimes coordinating with other programmers on a jointly developed program. A person who practices this skill is referred to as a computer programmer, software developer or coder. The sometimes lengthy process of computer programming is usually referred to as software development.
11. **Computer Terminal** – any input/output device connected by telecommunications links to a computer.
12. **C language** - is an imperative (procedural) systems implementation language. It was designed to be compiled using a relatively straightforward compiler, to provide low-level access to memory, to provide language constructs that map efficiently to machine instructions, and to require minimal run-time support. C was therefore useful for many applications that had formerly been coded in assembly language.
13. **C++ language** - is a statically typed, free-form, multi-paradigm, compiled, general-purpose programming language. It comprises a combination of both high-level and low-level language features. Some of its application domains include systems software, application software, device drivers, embedded software, high-performance server and client applications, and entertainment software such as video games.
14. **Data** - objective measurements of the attributes (characteristics) of entities such as people, places, things, and events.
15. **Data access** - typically refers to software and activities related to storing, retrieving, or acting on data housed in a database or other repository. Historically, different methods and languages were required for every repository, including each different database, file system, etc., and many of these repositories stored their content in different and incompatible formats.
16. **Decompiler** - is the name given to a computer program that performs the reverse operation to that of a compiler. That is, it translates a file containing information at a relatively low level of abstraction (usually designed to be computer readable rather than human readable) into a form having a higher level of abstraction (usually designed to be human readable)
17. **Documentation** – a collection of documents or information.
18. **Edit** – to modify the form or format of data

19. **End user –** anyone who uses an information system or the information it produces.
20. **Ergonomics** - the science and technology emphasizing the safety, comfort, and ease of use of human-operated machines. The goal of ergonomics is to produce systems that are user-friendly: safe, comfortable and easy to use.
21. **HTML**, which stands for HyperText Markup Language - is the predominant markup language for web pages. It is written in the form of HTML elements consisting of "tags" surrounded by angle brackets within the web page content. It is the building blocks of all basic websites.
22. **Information** – data placed in a meaningful and useful context for an end user.
23. **Information and Communication Technology (ICT) -** refers to technologies associated with the transmission and exchange of data in the form of sound, text, visual images, signals or any combination of those forms through the use of digital technology. It encompasses such services as telecommunications, posts, multimedia, electronic commerce, broadcasting, and information technology.
24. **Integrated development environment (IDE)** - is a software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consists of a source code editor, a compiler and/or interpreter, build automation tools, and (usually) a debugger. Typically an IDE is dedicated to a specific programming language, so as to provide a feature set which most closely matches the programming paradigms of the language. However, some multiple-language IDEs are in use, such as Eclipse, ActiveState Komodo, recent versions of NetBeans, and Microsoft Visual Studio.
25. **Java** - is a general-purpose, concurrent, class-based, object-oriented language that is specifically designed to have as few implementation dependencies as possible. It is intended to let application developers "write once, run anywhere". Java is currently one of the most popular programming languages in use, and is widely used from application software to web applications
26. **Java applications** - are typically compiled to bytecode (class file) that can run on any Java Virtual Machine (JVM) regardless of computer architecture.
27. **Local Area Network (LAN) –** a communications network that typically connects computers, terminals, and other computerized devices within a limited physical area such as an office, building, manufacturing plant and other work sites.
28. **Microsoft .NET Framework** - is a software framework that can be installed on computers running Microsoft Windows operating systems. It includes a large library of coded solutions to common programming problems and a common language infrastructure that manages the execution of programs written specifically for the framework. The .NET Framework supports multiple programming languages in a manner that allows language interoperability, whereby each language can utilize code written in other languages; in particular, the .NET library is available to all the programming languages that .NET encompasses.
29. **Microsoft SQL Server** - is a relational model database server produced by Microsoft. Its primary query languages are T-SQL and ANSI SQL
30. **Object code** - or an object file, is the representation of code that a compiler or assembler generates by processing a source code file. Object files contain compact code, often called "binaries". A linker is typically used to generate an executable or library by linking object files together. The only essential element in an object file is machine code (code directly executed by a computer's CPU). Object files for embedded systems might contain nothing but machine code. However, object files often also contain data for use by the code at runtime, relocation information, program symbols (names of variables and functions) for linking and/or debugging purposes, and other debugging information.

31. **Oracle -** the **Oracle Database** (commonly referred to as **Oracle RDBMS** or simply as **Oracle**) is an object-relational database management system [2] produced and marketed by Oracle Corporation.
32. **Oracle Forms** - is a software product for creating screens that interact with an Oracle database. It has a typical IDE including an object navigator, property sheet and code editor that uses PL/SQL. It was originally developed to run server-side in character mode terminal sessions. It was ported to other platforms, including Windows, to function in a client–server environment. Later versions were ported to Java where it runs in a Java EE container and can integrate with Java and web services. The primary focus of Forms is to create data entry systems that access an Oracle database.
33. **Oracle Reports** - is a tool for developing reports against data stored in an Oracle database. Oracle Reports consists of Oracle Reports Developer (a component of the Oracle Developer Suite) and Oracle Application Server Reports Services (a component of the Oracle Application Server).
34. **Outsourcing –** turning over all or part of an organization's information systems operation to outside contractors, known as systems integrators or facilities management companies.
35. **Programming language** - is an artificial language designed to express computations that can be performed by a machine, particularly a computer. Programming languages can be used to create programs that control the behavior of a machine, to express algorithms precisely, or as a mode of human communication.
36. **Quality Assurance –** methods for ensuring that information systems are free from errors and fraud and provide information products of high quality.
37. **Relational database management system (RDBMS) -** is a database management system (DBMS) that is based on the relational model as introduced by E. F. Codd. Most popular commercial and open source databases currently in use are based on the relational database model. A short definition of an RDBMS may be a DBMS in which data is stored in the form of tables and the relationship among the data is also stored in the form of tables.
38. **Service-oriented programming (SOP)** - is a programming paradigm that uses "services" as the unit of computer work, to design and implement integrated business applications and mission critical software programs. Services can represent steps of business processes and thus one of the main applications of this paradigm is the cost-effective delivery of standalone or composite business applications that can "integrate from the inside-out."
39. **Software –** computer programs and procedures concerned with the operation of an information system.
40. **Source code** - is any collection of statements or declarations written in some human-readable computer programming language. Source code is the means most often used by programmers to specify the actions to be performed by a computer.
41. **SQL,** often referred to as **Structured Query Language** - is a database computer language designed for managing data in relational database management systems (RDBMS), and originally based upon relational algebra. Its scope includes data insert, query, update and delete, schema creation and modification, and data access control.
42. **Standards –** measures of performance developed to evaluate the progress of a system toward its objectives
43. **System –** an assembly of methods, procedures, or techniques unified by regulated interaction to form an organized whole
44. **User- friendly** – a characteristic of human-operated equipment and systems that makes them safe, comfortable, and easy to use.

45. **User interface** - is the system by which people (users) interact with a machine. The user interface includes hardware (physical) and software (logical) components. User interfaces exist for various systems, and provide a means of: 1) Input, allowing the users to manipulate a system, and/or 2) Output, allowing the system to indicate the effects of the users' manipulation.
46. **VB.NET** – is a redesigned, object-oriented dialect of Visual Basic.
47. **Web application** - is an application that is accessed over a network such as the Internet or an intranet. The term may also mean a computer software application that is hosted in a browser-controlled environment (e.g. a Java applet) or coded in a browser-supported language (such as JavaScript, combined with a browser-rendered markup language like HTML) and reliant on a common web browser to render the application executable.
48. **Windows Forms -** is the name given to the graphical application programming interface (API) included as a part of Microsoft's .NET Framework, providing access to the native Microsoft Windows interface elements by wrapping the existing Windows API in managed code. While it is seen as a replacement for the earlier and more complex C++ based Microsoft Foundation Class Library, it does not offer a paradigm comparable to model–view–controller.
49. **Windows Forms application** - is an event-driven application supported by Microsoft's .NET Framework. Unlike a batch program, it spends most of its time simply waiting for the user to do something, such as fill in a text box or click a button.

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