Introduction

Please refer to the Guidance Notes provided, before completing each box, providing evidence to show how you have demonstrated that competence.

Your Details

Name:

Membership Number

Competence A

A1 **352**

During the project “Modelling requirements for global train collision Dynamic”, in (location),I was responsible fordeveloping a detailed understanding of the mechanisms leading to accidents, providing a parametric modeling analysis of the different railway components and functionalities, describing qualitatively crucial accident dynamic phenomena, and finally specifying the requirements of modeling and dynamics of accidents. Before beginning construction, I offered technical guidance to control all electrical infrastructures. In addition, I coordinated with stakeholders and governmental authorities on all of my projects and oversaw the work of all consultants. Additionally, I implemented and improved departmental procedures and policies while managing adherence to best practices and standards in my projects.

In this project, my work includes involves simulations and the study of key dynamical problems. These however depend on the numerical values of the estimated model parameters and it is a task for the next phase of the project. Part of the current work involves reviewing the

background literature, in terms of methodology and results and evaluating the available software tools for the study of train dynamics, and in particular dynamic simulations.

Additionally, I made sure that all work was done following design standards and codes. To become more acquainted with the most recent electrical goods, tools, and technology, I also spoke with various suppliers and manufacturers situated within the site premises. Additionally, I purchased goods from foreign vendors to gain a better idea of the costs associated with the materials and equipment. As a result, during my professional career, I have established a solid and positive relationship with these suppliers and manufacturers. Furthermore, I was primarily concerned with managing the technical papers for the project under ISO 9001 standards while supervising quality audits for each department. The process of testing, inspecting, controlling, etc. all of the supplies or tools utilized on the construction site.

I have always concentrated on creating environmentally friendly designs or solutions while also managing the suggested design's environmental assessment by EHS (Environmental, Health, and Safety) requirements. Additionally, I followed the legal requirements and best practices, which made sure that the modeling, simulations, and dynamics of the railway system were completed successfully.

A2 **(maximum 300 words) 397**

While working on this project my main concern was to study and resolvemechanisms leading to accidents and to come up with the working phenomena that could process safely under all circumstances.The study of accident dynamics, safety implications, and risks is a complex problem that has many constituent parts, the fundamental components of the problem that I came across were railway operational environment and accident causes, modeling of train system components, accident modeling, dynamics of normal and accident modes, modeling, and dynamics of an accident involving passengers and goods, Injury, loss, risk, insurance, and cost due to accidents.

To resolve all these issues, I studied accidents and implications that require an understanding of the fundamental causes and thus imply a classification of causes stemming from the Railway Operational Environment (ROE). This generic term refers to the problem environment, outside the train system and includes issues such as traffic operational modes and errors (signaling, Overspeed, etc that may lead to collisions and derailment), state of Infrastructure that may cause accidents (rail maintenance, condition of rolling stock, etc), and external disturbances and events that may cause accidents (such as objects on the line, extreme weather conditions, subsidence of rail, etc).

My study analysis and observations of normal operations dynamics required me to do the modeling of both the train system and the specific events associated with the different accident causes and their implications. Normal operations and the accident operational modes provide inputs that will drive the train system dynamics. Instrumental to this analysis is the modeling of the train system (unit vehicle and overall train).

I suggested a cellular automata-based generalised simulation model of train movements so that the scheduling commands are included in the model. The proposed model, which is based on the idea of instantaneous movement authority, often breaks down the entire journey into a series of moves on each block segment, with speed limits both at the beginning and conclusion of the section and inside of it. With changeable parameters, it defines both the dynamics of the train itself and the interactions between trains, realising dynamic speed updates similar to the feedback corrections of true train movements. The configurations of acceleration and deceleration mirror the control tactics. The entire range of train movement characteristics—autonomous, constrictive, and synergistic—was covered. The scheduling command has enhanced the transitory performance of train movements in addition to resolving the dispute.

Competence B

B1 **(maximum 300 words) 391**

I was involved in designing and simulation using OPERA -2D /3D package, Prototyping, testing, and handover. The product is successful and currently deployed in a working machine. TheElectromagnetic (EM) actuator valves based on the solenoids of the type addressed through City's research typically were operated in tight spaces with up to 128 individual valves squeezed into an array only a few tens of centimeters wide. Switching at between 150 and 300 cycles each second the valves can often overheat, reducing their lifespan. To be commercially viable within the current market, a valve must have a life of more than two billion cycles between maintenance sessions. I selected the design parameters to deliver better performance whilst complying with stringent food industry standards was critical. The city's contribution to building the next generation of valves to meet this challenge came from work done by the Computer Aided Modelling and Design Group (CAMAD) in our Sensors & Instrumentation Centre. I used advanced mathematical modeling and Computer Aided Design (CAD) techniques for understanding and designing sensors, actuators, and other related devices.

It is well established that the principal limitation to the lifespan of any EM actuator valve, based on the solenoid principle, is a mechanical failure caused by physical wear. This process has been carefully studied and modeled by our CAMAD Group, whose work has led to the development of a new advanced precision EM-valve-based ejector system for bulk food sorting technology. This has been achieved by performance modeling and design optimization of the ejector valve in terms of its material, geometric and operational parameters. For this relevant electric circuit, I solved the magnetic field and mechanical and thermal equations following finite element field modeling.

I achieved further design refinement and validation of computer models by extensive electromagnetic, thermal, and mechanical tests carried out on two batches of prototypes. This iterative cycle of simulation-tests-simulation has been key to achieving the tight design and performance parameters of the novel EM valve in terms of fast switching speed (150-300 Hz), large force (10 N) and extremely long lifetime typically lasting for 3-4 billion cycles before maintenance. This has also ensured very fast opening and closing times of the valve. Specifically, this has been achieved by optimizing electrical (coil inductance and resistance) and magnetic

circuit parameters (material, its annealing regimes, etc.) and by redesigning the valve drive circuitry. 391

B2 (maximum 300 words) 193

As a result of this work, a novel EM valve has been developed which is unique in terms of these performance parameters. The research aims, which were achieved, were to design and develop a novel ejector valve that would use a single pulse of air to 'surgically' remove a defective food item as small as an individual grain of rice or a coffee bean, lentil or peanut, from a fast-moving stream of such foodstuffs, passing the detector at 4 m/s. At present no other solenoid valve can match this unique combination of life, force, and speed. The technology ensures a much longer lifetime of such sorting machinery, more efficient use of materials and energy, and improved food quality and safety. This resulted in the development of the valve. With industrial partners including Buhler Sortex Ltd and Vogan & Company (now S&B Herba Foods), I explored ways of extending the lifespans of our next generation of valves, using magnetic shape memory smart alloys or MSMs. Theoretically, such materials cannot be overstrained and through this approach,I got the opportunity to create a new generation of ultra-high performance valves with the potential of an infinite lifespan. 193

B3 **(maximum 300 words) 369**

I designed the module Design-III Embedded System Design and delivered it to students. All the design modules were accredited by IET.This module will extend and further develop the practical, theoretical, and professional skills needed for designing and implementing complex embedded systems for a wide range of applications. An initial set of structured laboratory exercises will extend the student's understanding of the tools and techniques required, followed

by an assessed problem-based design exercise. Accompanying lectures will present the formal aspects of the module. Students will be given small design problems to consider as part of their independent study in support of the lectures.

While designing the system I understood the need for embedded computer systems and the requirements imposed on them by their application scenario.I applied an engineering process to design, implement and validate embedded systems and understood the different levels of abstraction that are used throughout the design process, and decided the most appropriate abstractions at each step.I checked the hardware/software implementation trade-offs, and several partitioning, mapping, and evaluation techniques that to analyze that trade-off for a particular application scenario.I programmed computing platforms that have limited performance, energy, memory, and storage capacity and designed and evaluated custom hardware architectures.

This module introduced the design, simulation and synthesis of digital systems (FPGA) using the VHDL and will elaborate on VHDL design flow; structural, behavioral, and dataflow descriptions; VHDL data types and operators; processes and behavioral commands; simulation cycle and delta delays; timing, delays, and clocks; sequential circuits; finite state machines; test benches; text input/output; synthesis and realization; programmable logic devices.

The lecture course was accompanied by a set of laboratory exercises on digital design using the hardware description language VHDL. The laboratory work covers all stages of the FPGA design process. It involves hands-on exposure to the CAD tools such as Xilinx ISE and a prototyping board (containing a Xilinx Spartan-6 FPGA). I used the practical component as a project-driven learning vehicle in the course. The students learn and discover new knowledge by carrying out the design assignments. Given the general principles of VHDL in lectures, they learn further details about the language and the design tools through hands-on experience guided by computer-aided learning materials, design tutorials and laboratory supervision.

Competence C

C1 ***(maximum 200 words) 202***

I followed the methodology of designing and implementing large digital systems. Students taking this module will learn how to create reliable digital systems using synchronous design techniques, will learn how to create digital systems which are easily testable, and will be able to use a range of software tools to synthesize digital systems.On completing the module students will be able to:

1. design reliable digital systems using synchronous design techniques.
2. design digital systems which are easily testable.
3. appreciate a range of software for the synthesis of digital systems.
4. Understand the major engineering problems associated with building high-speed digital systems and how they are solved

I also developed 4CCE1MCP Making a Connection Group Project that was able to achieve the following tasks:

To extend and deepen students' grasp of the practical application of electrical and mechanical engineering knowledge

To make students familiar with a variety of simulation and modeling tools

To further develop students' understanding of team dynamics and the importance of teamwork

To teach students conflict-resolution skills

To teach students the principles of risk management as they apply to engineering projects

Introduce students to the background and applications of wireless communication technologies and protocols, system integration, and information engineering.

C2 **(maximum 200 words) 223**

I oversaw internal meetings held in Qatar to create a timetable of long lead electrical items, ensuring that all necessary components could be delivered to the building site by the dates specified in the program to prevent delays. In this discussion, the specific delivery dates for

baseline program materials, long lead item delivery estimates, and purchase order specifics from the contractor were discussed. I also created a risk register, which I filled out with information about any project activity that might take longer than intended to finish and its repercussions. After coming up with a suitable plan to deal with the delays, I sent contractors weekly delivery reports and, in some circumstances, told them to ship by air freight if it was possible. To guarantee that each activity was completed within the specified budget and quality requirements, I also initiated corrective action.

Additionally, I created a project schedule that outlined the tasks, milestones, and their beginning and finishing dates. Additionally, I gave each member a variety of jobs based on their skills, and I calculated the total workforce needed for the duration of the project. Additionally, I provided all project-related documentation, including shop drawings, timetables, and technical submittals, to the team members operating under my direction so they could comprehend the demands of the project and guarantee the timely completion of each task.

C3 **(maximum 200 words) 152**

Leading the group of electrical engineers, draughtsmen, document controllers, and secretaries was my responsibility. Before beginning any activity, it is my top priority to brief my team on the project needs, schedule planning, time frame details, drawings, electrical work, etc. In one of the short-term designs and build projects, I collaborated with other electrical engineers and project participants to obtain the necessary approvals from authorities so that work could be done on the site per the established timetable. However, the COVID pandemic caused some delays in gaining approvals, therefore in those instances, I executed the drawings after receiving authority and client consent.

I also studied and made a design analysis of the existing systems, acknowledging what limitations are required and which strategies have been implemented. I compared all the existing theories and then determined my approaches while designing the system to develop a cost-efficient versatile system that works with the best performance.

C4 **(maximum 200 words) 226**

My approach is tailored to each client's specific needs and requirements, which ensures that my solutions are always up-to-date and fit for purpose. I am committed to providing the best possible service and support to our clients, which guarantees that they will be satisfied with our work. I have extensive experience in automating processes and managing projects effectively. I have a proven track record of successfully implementing automation solutions for our clients and am well-versed in the latest project management methodologies and tools.

Experience with automating electrical wiring systems is a must. Good knowledge of how electrical wiring systems work and the ability to troubleshoot and repair issues will be critical for the success of this project.

Good knowledge of electrical wiring systems is essential, as automation equipment can be dangerous if not used correctly. Familiarity with automated equipment from different manufacturers will help ensure proper installation and commission of the system.

I have worked on a variety of building automation projects that have showcased my skills and abilities in this field. These projects have ranged from installing and configuring basic systems to developing more advanced solutions for problems that arise. I enjoy working on challenging projects that require creative thinking as well as technical expertise. These skills make me an ideal candidate for positions in which you need someone who can problem-solve rapidly under pressure.

Competence D

D1 **(maximum 100 words) 100**

I set up weekly and biweekly meetings to maintain and handle the official technical correspondence between the company, contractors, authorities, and clients. In these technical meetings, I discussed design review reports, presented the team's performance and the work's progress, submitted reports and documents to the appropriate authorities, and talked about the meeting agendas. To ensure proper design implementation, I continuously interacted with the team and my line manager at all project submission levels at the engineering and project management levels. This interaction included emails, phone calls, and technical meetings at the company's and the subcontractor's facilities on the site premises.

D2 **(maximum 100 words) 131**

To record the steps taken and the results of design work, I created design reports. It aided me in efficiently communicating with the team and presenting the design idea. In between the detailed design phases of the project, I also held design review presentations to gather input from the senior engineers and confirm that everything was proceeding according to plan. I promoted healthy debates in the presentation to identify long-term ideas or approaches to carry out and finish any work.

I used to hold Zoom meetings during this epidemic when I made presentations to discuss issues that came up with the design process. I gave an example of the design that must be used to complete the project following the needs of the specifications, customer ideas, design standards, and IEC standards.

D3 **(maximum 100 words) 114**

I had trouble in the early phases of the epidemic because the job that was given to me had to be finished on time, which needed a lot of cooperation across disciplines. As a result, I set up online sessions to resolve the problems while taking into account the needs to achieve the specified job results. I took into account the views of each person by establishing a stress-free environment to cope with the current issue efficiently without delaying or increasing the expense of the project. This assisted me in creating a functional workspace as well. I also thought about adopting

standard managerial and technical processes to swiftly resolve disputes between teams or departments.

Commitment E

E1, E2, E3, E4, E5 **(maximum 300 words) 147**

As a Senior Electrical Design Engineer with vast experience in my field after availing training, seminars, technical meetings, and passing certification courses like NFPA 72 and I am fully aware of Electrical Codes and standards like Kahramaa standards (IEC and BS standards), QCDD guideline for fire alarm system, MOISSD for security systems, QCS Qatar Construction Standards and OOREDOO guideline for Telecom system. I designed the project by considering the above-mentioned standards, guidelines, and client-specific requirements and by the technical feasibility study. Also, I worked to create a safe working environment by adhering to safety regulations, environmental policies, etc. to maintain the quality of the project work as per ISO standards.

I prepared action plans or strategies to meet personal and organizational objectives. Then, in this regard, I attended numerous training which helped me in maintaining CPD activities along with evaluation of the project's results against action plans.

E2: 186

I have considered relevant codes and standards for electrical distribution design as it relates to safety. The most widely known electrical design code is NFPA 70: National Electrical Code. The NEC is the benchmark for safe electrical design, installation, and inspection to protect people and property from electrical hazards. When designing a safe electrical distribution system, as a senior electrical design engineer I have a great deal to consider. The system is designed with the proper circuit protection strategies. The system is designed to ensure safe end-use devices to protect the occupant. Furthermore, I need to coordinate with other experts such as mechanical, plumbing, fire protection, and structural engineers as well as architects, contractors, and owners to ensure the safe integration of all systems. As a designer, I played an important role in the safe operation of an electrical distribution system ranging from the point at which the service enters the building to the end user devices. However, electrical safety does not end with design, therefore, I ensured maintaining a safe working environment requires protocols for safe day-to-day operations and safe handling and maintenance of equipment.

E3: 165

I designed projects by considering ways to minimize light trespass from the building and site, increase night sky access, improve night-time visibility via glare reduction, and reduce nocturnal environmental impact. This was achieved by installing Lighting interior spaces with occupancy sensors and/or being time controlled, or the interior lighting fixture layout designed to minimize light trespass out the windows.
For building lighting usage, I designed the electrical lightning system by following the required lighting power densities (watts/SF) per ASHRAE/IESNA Standard 90.1-2004. Incorporating the use of creative controls such as occupancy sensors, timers, and daylight harvesting systems helped reduce building energy consumption. As an electrical designer, I included specific directions in the project specifications so that the contractor understands the plan. At a minimum, recycling waste copper, and conduit materials are targeted, and selecting 10% to 20% of the building products to

incorporate recycled content materials. The product selected can contribute to a healthier indoor environment for the building, which can lead to improved worker productivity.

E4: 88

I enrolled in multiple training and workshops along with certifications which significantly updated my current knowledge and I implemented them in my project. I am always keen to explore and deliver to achieve the best goals. Furthermore, I often consult and take opinions from my line managers and seniors who have been a part of my career journey. Guidance from them to learn and grow in the latest technologies used in the Electrical field. I make sure to explore the latest software or training related to my work.

E5: 147

Being an Electrical Design Engineer, I came across lots of issues and often encounters major issues which are to be dealt with ethically Professional and experience skills. Therefore, in these situations, I ethically aligned design prioritizes, human values, integrity, honesty, etc. to provide the same rights to the people so as to protect and increase planetary flourishing now and in the future. Furthermore, during issues or conflicts, I adopted the strategy of complete analysis or evaluation to check the root cause and factors causing a particular problem. After this, I considered the opinions of my teammates who are involved in this situation, and then I provided a solution considering all aspects to eradicate the issue. I am aware of the ethical code of conduct specified by the company in the contract document and I implemented all ethical rules while dealing with the client's representatives, engineers, technicians, etc.

Candidate Signature	Date

Supporters Name	Supporter Signature	Date

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