Program: BE Instrumentation Engineering

Curriculum Scheme: Revised 2016

Examination: Final Year Semester VIII

Course Code and Course Name: ISDLO8045 Functional Safety (FS)

Time: 1hour Max. Marks: 50

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**Sample Question Bank**

Module 1: No. of questions: (1-14)

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| Q1. | How much more risk reduction does a SIL4 system provide than a SIL1? |
| Option A: | A factor of 1,000  |
| Option B: | A factor of 3  |
| Option C: | A factor of 10  |
| Option D:  | A SIL1 system provides more risk reduction |
|  |  |
| Q2. | NFPA 85 standard provides: |
| Option A: | Safe operation |
| Option B: | Prevention from uncontrolled fires, explosions and implosions |
| Option C: | Burner Safety Management |
| Option D:  | Safe operation, Prevention from uncontrolled fires, explosions and implosions as well as Burner Safety Management |
|  |  |
| Q3. | Oil spilled on the floor is an example of: |
| Option A: | Hazard |
| Option B: | Harm |
| Option C: | Consequence |
| Option D:  | Probability of failure |
|  |  |
| Q.4. | How many parts does the IEC 61508 has? |
| Option A: | Seven |
| Option B: | One |
| Option C: | Four |
| Option D:  | Three |
|  |  |
| Q5. | The ANSI/ISA 84.00.01-2004 standard is also known as : |
| Option A: | IEC 61508 |
| Option B: | IEC 61511 Mod |
| Option C: | API-RP  |
| Option D:  | AIChE-CCPS |
|  |  |
| Q6.  | NFPA 85 standard provides: |
| Option A: | Safe operation |
| Option B: | Prevention from uncontrolled fires, explosions and implosions |
| Option C: | Burner Safety Management |
| Option D:  | Safe operation, Prevention from uncontrolled fires, explosions and implosions as well as Burner Safety Management |
|  |  |
| Q7. | Which of the following standards is designed for process safety management of highly hazardous chemicals? |
| Option A: | API RP 556 |
| Option B: | API RP 14C |
| Option C: | ANSI/ISA-84.00.01-2004 |
| Option D:  | OSHA (29 CFR 1910-119) |
|  |  |
| Q8.  | IEC has developed one of the following standards to provide specific guidance to the process industry using IEC 61508 as the umbrella standard: |
| Option A: | API RP 556 |
| Option B: | API RP 14C |
| Option C: | IEC 61511 |
| Option D:  | ANSI/ISA-84.00.01-2004 |
|  |  |
| Q9. | Which of the following is not one of the stages of risk analysis: |
| Option A: | Hazard identification |
| Option B: | SIL assignment |
| Option C: | Hazard analysis  |
| Option D:  | Risk assessment |
|  |  |
| Q10.  | Risk Analysis means: |
| Option A: | To measure the rate of unsafe failures |
| Option B: | To identify the potential sourced of harm |
| Option C: | Comparing the risk values determined against tolerability criteria  |
| Option D:  | To study cause and effect between the identified hazard and the hazardous events (accidents) to which they might lead |
|  |  |
| Q11. | Probability of a safety-related system satisfactorily performing the required safety functions under all the stated conditions within a stated period of time – means |
| Option A: | Functional Safety  |
| Option B: | Safety Integrity |
| Option C: | Availability  |
| Option D:  | Probability of Failure on Demand |
|  |  |
| Q12.  | Which one of the following components is not a logic solver? |
| Option A: | Relay |
| Option B: | PLC |
| Option C: | Solid state device |
| Option D:  | Transmitter |
|  |  |
| Q13. | In HSE – PES document Part 1—“An Introductory Guide”—is only 17 pages and was intended primarily for : |
| Option A: | Managers  |
| Option B: | Engineers |
| Option C: | Administration |
| Option D:  | Financial |
|  |  |
| Q14. | A safety instrumented function that has a risk reduction factor of 900 meets: |
| Option A: | SIL1 |
| Option B: | SIL2 |
| Option C: | SIL3 |
| Option D:  | SIL4 |

Module 2: No. of questions: (1-14)

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| Q1.  | What is SLC? |
| Option A: | Safety Life Cycle |
| Option B: | Secure Life Cycle |
| Option C: | Simple Life Cycle |
| Option D:  | Security Life Cycle |
|  |  |
| Q2. | Safety Life Cycle is --------- type of process. |
| Option A: | Open Loop  |
| Option B: | Closed Loop  |
| Option C: | Feed forward type |
| Option D: | Not a Loop at all |
|  |  |
| Q3.  | IEC 61508 Parts 1-3 are |
| Option A: | Definitions |
| Option B: | Applications  |
| Option C: | Additional related information |
| Option D:  | Guidance on Management, Development, Deployment & operations of E/E/PES |
|  |  |
| Q4. | IEC 61508 Parts 4-7 are |
| Option A: | Definitions, Applications & additional related information |
| Option B: | Operations of E/E/PES |
| Option C: | Operations of Electrical systems |
| Option D:  | Operations of Programmable Electrical systems |
|  |  |
| Q5. | IEC 61508 SLC phases are |
| Option A: | Analysis, Realization, Operation |
| Option B: | Software requirements |
| Option C: | Overview of techniques & measures |
| Option D: | Guidelines on Application of IEC 61508-2 & 61508-3 |
|  |  |
| Q6. | IEC 61508 Analysis phase consists of: |
| Option A: | Design and fabrication of SIS |
| Option B: | Identifying hazards and hazardous events  |
| Option C: | Eventual decommissioning of SIS  |
| Option D:  | Operation |
|  |  |
| Q7.  |  Realization phase of safety life cycle consists of |
| Option A: | Identifying hazards and hazardous events  |
| Option B: | Eventual decommissioning of SIS  |
| Option C: | Design and fabrication of SIS |
| Option D:  | Operation |
|  |  |
| Q8. | In the U.S., OSHA (Occupational Safety and Health Administration) documented that since the adoption of their process safety management regulation, the number of accidents has decreased over:  |
| Option A: | 5% |
| Option B: | 10% |
| Option C: | 15% |
| Option D: |  20% |
|  |  |
| Q9. | What is SRS? |
| Option A: | Safety Requirement Specifications |
| Option B: | Secure Requirement Specifications |
| Option C: | Safety Request Specifications |
| Option D:  | Security Request Specifications |
|  |  |
| Q10.  | Identify the activity which is done in Operation phase of SLC? |
| Option A: | Identifying hazards & hazardous events  |
| Option B: | Validation, Planning and Decommissioning  |
| Option C: | Likelihood these hazardous events will occur  |
| Option D:  | Design & fabrication of SIS |
|  |  |
| Q11. | In Hazard and risk analysis following technique is used: |
| Option A: | Flow chart |
| Option B: | Specification Sheet |
| Option C: | HAZOP, Fault Tree, What-If |
| Option D:  | MOC |
|  |  |
| Q12.  | Safety Integrity Level is a measure of |
| Option A: | Process parameters |
| Option B: | MOC |
| Option C: | Design Parameters of System |
| Option D:  | Safety System performance |
|  |  |
| Q13. | Safety requirement specification consists of: |
| Option A: | Documenting I/O Requirements, Functional logic, SIL of each function |
| Option B: | Detailed information about MOC |
| Option C: | Design Parameters of System |
| Option D:  | Safety System performance |
|  |  |
| Q14. | Design phase of Safety Life cycle consists of: |
| Option A: | Decommissioning  |
| Option B: | Conceptual Design, Detail design, Factory Testing |
| Option C: | What if analysis |
| Option D:  | Commissioning  |

Module 3: No. of questions: (1-18)

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| --- | --- |
| Q1. | Which is an example of safety instrumented system Technology? |
| Option A: | Transducer |
| Option B: | Relay system / pneumatic system / solid state system  |
| Option C: | Transmitter |
| Option D:  | Control valve |
|  |  |
| Q2. | TMR systems are |
| Option A: | Tertiary Modular Redundant System |
| Option B: | Triple Modular Reluctant System |
| Option C: | Triple Modular Redundant System |
| Option D:  | Tertiary Modular Redundant System |
|  |  |
| Q3. | Which standard introduced the concept of high demand or continuous system? |
| Option A: | IEC 61511 |
| Option B: | IEC 61508 |
| Option C: | ISA  |
| Option D:  | FMEA |
|  |  |
| Q4.  | HSE means |
| Option A: | Health Safety Environment |
| Option B: | High Safety Executive |
| Option C: | Health Safety Executive |
| Option D:  | High Safety Environment |
|  |  |
| Q5. | Protection layers are classified as |
| Option A: | Only Prevention |
| Option B: | Prevention & Mitigation |
| Option C: | Only Mitigation |
| Option D:  | Safety layers |
|  |  |
| Q6. | Multiple safety layers in any facility are designed |
| Option A: | To reduce the probability of an accident |
| Option B: | To increase the probability of an accident |
| Option C: | To increase reliability of the system |
| Option D:  | To reduce reliability of the system |
|  |  |
| Q7. | Protection layers can be well explained by: |
| Option A: | Flow chart  |
| Option B: | Onion Diagram |
| Option C: | Fault Tree structure |
| Option D:  | Programming modes |
|  |  |
| Q8. | Which of the following is an example of prevention layer? |
| Option A: | Containment Systems |
| Option B: | Scrubbers and flares |
| Option C: | Safety Instrumented systems |
| Option D:  | Fire and Gas systems |
|  |  |
| Q9. | Identify a physical protection device to prevent over-pressurisation of a vessel. |
| Option A: | Globe valve |
| Option B: | Needle valve |
| Option C: | Relief valves and rupture discs |
| Option D:  | Solenoid valve |
|  |  |
| Q10. | What is HAZOP? |
| Option A: | Hazard and Operability studies |
| Option B: | Hazard Operations  |
| Option C: | Heavy, hazardous Operability studies |
| Option D:  | Non-Hazard Operations  |
|  |  |
| Q11. | Shutdown systems are designed : |
| Option A: | To bring plant to safe state resulting in stopping production |
| Option B: | To measure process abnormalities |
| Option C: | To ignore abnormal process parameters |
| Option D:  | To transmit the output of a device |
|  |  |
| Q12. | Which of the following is an example of mitigation layer? |
| Option A: | Process Plant Design |
| Option B: | Alarm Systems |
| Option C: | Evacuation Procedures |
| Option D:  | Safety Instrumented System |
|  |  |
| Q13. | For passive independent protection layer such as dike the probability of failure on demand (PFD) is |
| Option A: | 1 x 10-1 |
| Option B: | 1 x 10-2 |
| Option C: | 1 x 10-3 |
| Option D:  | 1 x 10-4 |
|  |  |
| Q14. | Identify prevention layers from the following: |
| Option A: | Alarm and operator intervention system |
| Option B: | Containment Systems |
| Option C: | Scrubbers and flares |
| Option D:  | Fire and Gas systems |
|  |  |
| Q15. | Gas flares are used: |
| Option A: | for controlling Process parameters |
| Option B: | to store the gasses |
| Option C: | to burn of waste gasses |
| Option D:  | as pollution control device, purify exhaust |
|  |  |
| Q16. | FMEA stands for: |
| Option A: | Fire Mode and effects Analysis |
| Option B: | Fire Mode and energy Analysis |
| Option C: | Failure Mode and energy Analysis |
| Option D:  | Failure Mode and effects Analysis |
|  |  |
| Q17. | FMEDA  stands for: |
| Option A: | Failure Mode effects and Diagnostic Analysis |
| Option B: | Failure Mode effects and Discrete Analysis |
| Option C: | Fire Mode effects and Discrete Analysis |
| Option D:  | Failure Mode, energy and Diagnostic Analysis |
|  |  |
| Q18. | Dikes are used for: |
| Option A: | Containment of hydrocarbon release/spills |
| Option B: | as pollution control device, purify exhaust |
| Option C: | Burn of flammable gas released |
| Option D:  | Controlling Process parameters |

Module 4: No of questions: (1-18)

|  |  |
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| Q1.  | A dice is thrown. Find the probability of getting an even number. |
| Option A: | 2/3 |
| Option B: | 1 |
| Option C: | 5/6 |
| Option D:  | 1/2 |
|  |  |
| Q2. | Two coins are thrown at the same time. Find the probability of getting both heads. |
| Option A: | 3/4 |
| Option B: | 1/4 |
| Option C: | 1/2 |
| Option D: | 0 |
|  |  |
| Q3. | Two dice are thrown simultaneously. The probability of getting a sum of 9 is: |
| Option A: | 1/10 |
| Option B: | 3/10 |
| Option C: | 1/9 |
| Option D: | 4/9 |
|  |  |
| Q4. | A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, then the number of blue balls in a bag is: |
| Option A: | 5 |
| Option B: | 10 |
| Option C: | 15 |
| Option D: | 20 |
|  |  |
| Q5. | A box of 600 bulbs contains 12 defective bulbs. One bulb is taken out at random from this box. Then the probability that it is non-defective bulb is: |
| Option A: | 143/150 |
| Option B: | 147/150 |
| Option C: | 1/25 |
| Option D:  | 1/50 |
|  |  |
|  |  |
| Q6. | What type of event the following equation represent?P(A’) = 1 – P(A)“The probability of A is equal to one minus the probability of A” |
| Option A: | Independent Event |
| Option B: | Dependent Event |
| Option C: | Mutually Exclusive Event |
| Option D:  | Complementary Event |
|  |  |
| Q7.  | The probability of the successful operation of check valve for next year is 0.89. what is the probability of failure for the same year? |
| Option A: | 0.2 |
| Option B: | 0.11 |
| Option C: | 0.33 |
| Option D:  | 0.011 |
|  |  |
| Q8.  | A water coolant supply consists of two pumps; one is electrically driven and the other is steam driven. Both pumps are continuously operating and together must supply an adequate amount of cooling water. Over one year, probability that pump A fails is 0.02 and probability that pump B fails is 0.03. What is the probability that the cooling water system will fail to operate over the course of one year? |
| Option A: | 0.04 |
| Option B: | 0.0494 |
| Option C: | 0.03 |
| Option D:  | 0.1 |
|  |  |
| Q9. | The number of failures divided by the total mission time of the equipment is: |
| Option A: | SIL |
| Option B: | MTTF |
| Option C: | Failure rate  |
| Option D:  | MTBF |
|  |  |
| Q10.  | The inverse of failure rate is called as: |
| Option A: | SIL |
| Option B: | MTTF |
| Option C: | Failure rate  |
| Option D:  | MTBF |
|  |  |
| Q11. | If the device remains untested for longer amount of time, the PFD of the device: |
| Option A: | Increases |
| Option B: | Decreases |
| Option C: | Remains same |
| Option D:  | Not related |
|  |  |
| Q12. | What is FTA? |
| Option A: | Free Tree Analysis |
| Option B: | Fault Tree Analysis |
| Option C: | Fault Top Analysis |
| Option D:  | Free Top Analysis |
|  |  |
| Q13. | Which one of the following options is defined as likelihood that the safety function does not work when required to? |
| Option A: | Mean time to failure |
| Option B: | Probability of failure on demand |
| Option C: | Mean time between failure |
| Option D:  | Failure Rate |
|  |  |
| Q.14 | IEC 61508/61511 and ISA 84.01 use one of the following as the system metric upon which the SIL is defined. |
| Option A: | Mean time between failure |
| Option B: | Average Probability of failure on demand |
| Option C: | Mean time to failure |
| Option D:  | Failure density |
|  |  |
| Q15. | If the Mean Time to Failure of a pressure transmitter is 7.67 million hours, the value of Failure Rate per million hours is |
| Option A: | 0.1 |
| Option B: | 1 |
| Option C: | 0.31 |
| Option D:  | 0.13 |
|  |  |
| Q16. | In fault tree analysis, the basic event is represented by - |
| Option A: | Square |
| Option B: | Diamond |
| Option C: | Circle |
| Option D:  | Checkbox |
|  |  |
| Q17. | Safety Availability depends on: |
| Option A: | Failure rate |
| Option B: | Failure mode |
| Option C: | Safe factor |
| Option D:  | Failure factor |
|  |  |
| Q18. | The probability of events must lie in the limits of |
| Option A: | 1 to 2 |
| Option B: | 2 to 3 |
| Option C: | 1 to 2 |
| Option D:  | 0 to 1 |

Module 5: No. of Questions: (1-28)

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| Q1.  | What is the main purpose of hazard identification? |
| Option A: | To minimize the effect of a consequence |
| Option B: |  For better risk management |
| Option C: | To characterize adverse effect of toxins |
| Option D:  | To reduce probability of occurrence |
|  |  |
| Q2. | Which of the following data is not required for hazard identification? |
| Option A: | Land use |
| Option B: | Contaminant levels |
| Option C: | Affected population |
| Option D: | Estimation of risk |
|  |  |
| Q3. | Hazard identification mainly focus on: |
| Option A: | Chemical source and concentration |
| Option B: | Chemical exposure |
| Option C: | Chemical analysis |
| Option D: | Chemical pathway |
|  |  |
| Q4.  | Who is responsible for risk management? |
| Option A: | Customer |
| Option B: | Investor |
| Option C: | Developer |
| Option D: | Project team |
|  |  |
| Q5. | Risk is expressed in terms of : |
| Option A: | Probability and impact |
| Option B: | Probability of positive consequences |
| Option C: | Probability of occurrence  |
| Option D:  | Probability of safety |
|  |  |
| Q6.  | Which of the following technique will ensure that impact of risk will be less? |
| Option A: | Risk avoidance technique |
| Option B: | Risk Mitigation technique |
| Option C: | Risk contingency technique |
| Option D:  | Consequences analysis technique |
|  |  |
| Q7. | Probability of the event that might occur and Severity of the event if it occurs is known as: |
| Option A: | Accident |
| Option B: | Hazards |
| Option C: | Risk |
| Option D:  | Loss |
|  |  |
| Q8. | Which of the following is a hazard qualification method? |
| Option A: | FMEA |
| Option B: | Fault tree |
| Option C: | HAZOP |
| Option D:  | What if analysis |
|  |  |
| Q9. | What is the measure of the expected effects of an incident outcome case? |
| Option A: | Consequence |
| Option B: | Likelihood |
| Option C: | Prediction  |
| Option D:  | Estimation  |
|  |  |
| Q10. | The best way to audit the efficiency of the disaster/ accident preparedness is: |
| Option A: | Walk through survey |
| Option B: | Tabletop experiences |
| Option C: | Mock drills at field |
| Option D:  | Public survey |
|  |  |
| Q11. | The amount of error resulting from the subjectiveness of qualitative estimates of consequence magnitude is often unacceptable for :  |
| Option A: | Risk reduction engineering |
| Option B: | Risk mitigation engineering |
| Option C: | Hazard analysis engineering  |
| Option D:  | Risk improvement engineering |
|  |  |
| Q12. | Which of the following color is used for radiation hazard? |
| Option A: | Red |
| Option B: | Orange |
| Option C: | Green |
| Option D:  | Purple |
|  |  |
| Q13. | What are the two main causes of incidents in the workplace? |
| Option A: | Unsafe acts and unsafe people  |
| Option B: | Unsafe people and unsafe machines  |
| Option C: | Unsafe conditions and unsafe machines |
| Option D:  | Unsafe acts and unsafe conditions. |
|  |  |
| Q14. | Risk is a function of : |
| Option A: | Consequences and failures |
| Option B: | Likelihood and density |
| Option C: | Consequences and likelihood |
| Option D:  | Damage and loss |
|  |  |
| Q15. | Which of the following analysis method is effective when sufficient data is available, but size of data set is very large? |
| Option A: | Qualitative Methods |
| Option B: | Semi-Quantitative Methods |
| Option C: | Mathematical statements |
| Option D:  | Statistical Analysis of Accidents |
|  |  |
| Q16. | The consequence of an incident will depend on the:  |
| Option A: | Size of the incident’s effect zone and the zone’s occupancy |
| Option B: | Magnitude of incident |
| Option C: | Reason of incident |
| Option D:  | Time of incident |
|  |  |
| Q17. | In Markov analysis, a state of event or system is represented by: |
| Option A: | Square |
| Option B: | Circle |
| Option C: | Rectangle  |
| Option D:  | Star shape  |
|  |  |
| Q18. | Which of the following is not a preoperational root cause of failure of an event? |
| Option A: | Manufacturing errors |
| Option B: | Environmental stress errors |
| Option C: | Construction errors |
| Option D:  | Installation errors |
|  |  |
| Q19. | In event tree analysis-------- are used. |
| Option A: | Block diagrams  |
| Option B: | Flow diagrams  |
| Option C: | branches |
| Option D:  | Mathematical models  |
|  |  |
| Q20. | Quantitative risk analysis logic models consist of -------analysis. |
| Option A: | Event tree and fault tree |
| Option B: | Product and loss trees |
| Option C: | Harm and loss tree |
| Option D:  | Consequences tree |
|  |  |
| Q21. | If the occurrence of one event does not change the probability of the other occurring, then the events are called as  |
| Option A: | Independent Event |
| Option B: | Dependent Event |
| Option C: | Mutually Exclusive Event |
| Option D:  | Complementary Event |
|  |  |
| Q22. | When using fault tree quantitatively, the output of an OR gate is determined by using |
| Option A: | Probability Addition |
| Option B: | Probability Subtraction |
| Option C: | Probability Multiplication |
| Option D:  | Compliment of probability |
|  |  |
| Q23. | According to CPQRA, an event that propagates or mitigates the initiating event during an event sequence is known as: |
| Option A: | Initiating event |
| Option B: | Intermediate event |
| Option C: | Top event |
| Option D:  | Basic event |
|  |  |
| Q24. | Delayed ignition of the cloud may lead to a : |
| Option A: | Vapor cloud explosion |
| Option B: | Vapor cloud emission |
| Option C: | Vapor clod ignition |
| Option D:  | BLEVE |
|  |  |
| Q25. | The effect zone of a jet fire is also known as : |
| Option A: | Torch fire |
| Option B: | Toxic fire |
| Option C: | Flash fire |
| Option D:  | fireball |
|  |  |
| Q26. | A toxic release has an effect zone of 1000 ft2, and is released into an area where the population density is 0.0002 person/ ft2 with no normally occupied buildings. The effect zone was determined for a 50% vulnerability of fatality. What will be the probable loss of life? |
| Option A: | 0.14 persons for that individual event |
| Option B: | 0.1 persons for that individual event |
| Option C: | 0.01 person for that individual event |
| Option D:  | 0.001 persons for that individual event |
|  |  |
| Q27. | A process plant has a replacement cost of Rs. 25million. The same plant has a plot plant 70 meters long and 80 meters wide. What is the average capital density of this plant? |
| Option A: | 4464 per m2 |
| Option B: | 446 per m2 |
| Option C: | 44642 per m2 |
| Option D:  | 1435 per m2 |
|  |  |
| Q28. | Consequence modeling tool that performs computer calculations of taxic gas effect zones is: |
| Option A: | ALOHATM |
| Option B: | EPA |
| Option C: | FEMA |
| Option D:  | DOT |

Module 6: No of questions: (1-18)

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| Q1.  | SIL is the measure of: |
| Option A: | Process control system performance |
| Option B: | Safety system performance |
| Option C: | Alarm system performance |
| Option D:  | Relief valve performance |
|  |  |
| Q2. | The risk reduction factor for safety integrity level SIL3 is: |
| Option A: | 1000-10000 |
| Option B: | 100-1000 |
| Option C: | 10-100 |
| Option D:  | 0-10 |
|  |  |
| Q3. | The following parameters is not considered in risk graph to determine SIL: |
| Option A: | Consequence |
| Option B: | occupancy |
| Option C: | Demand rate |
| Option D:  | Failure mode |
|  |  |
| Q4. | For safety integrity level SIL4, the dangerous failure per hour is : |
| Option A: |  ≥10-9<10-8 |
| Option B: |  ≥10-8<10-7 |
| Option C: | ≥10-7<10-6 |
| Option D:  | ≥10-6<10-5 |
|  |  |
| Q5.  | In SIL2, SIF decreases the frequency of an accident by---- orders of magnitude. |
| Option A: | One |
| Option B: | Two |
| Option C: | Three |
| Option D:  | Four |
|  |  |
| Q6.  | Probability of failure on demand for safety integrity level SIL3 is: |
| Option A: | 0.0001 – 0.00001 |
| Option B: | 0.001 -0.0001 |
| Option C: | 0.01 – 0.001 |
| Option D:  | 0.1 – 0.01 |
|  |  |
| Q7.  | For active independent protection layer such as relief valve the probability of failure on demand (PFD) is |
| Option A: | 1 x 10-1 |
| Option B: | 1 x 10-2 |
| Option C: | 1 x 10-3 |
| Option D: | 1 x 10-4 |
|  |  |
| Q8. | LOPA diagram is a special form of -------that is optimised to determine the frequency of an unwanted event.  |
| Option A: | Markov analysis |
| Option B: | Event tree analysis |
| Option C: | Fault tree analysis |
| Option D:  | Reliability block diagram |
|  |  |
| Q9.  | The safety availability for safety integrity level SIL2 is: |
| Option A: | 99.99 - 99.999% |
| Option B: | 99.9 - 99.99% |
| Option C: | 99 – 99.9% |
| Option D:  | 90 -99% |
|  |  |
| Q10. | The protection layers that are engineered to reduce risk should meet the following criteria: |
| Option A: | Specificity, independace, dependability, Auditability |
| Option B: | Simplicity, independace, dependability, Accessibility |
| Option C: | Specificity, integral, dependability, Accessibility |
| Option D:  | Simplicity, independace, derivative, Auditability |
|  |  |
| Q11.  | Ignition probability does not depend on the following : |
| Option A: | Volatility |
| Option B: | Reactivity |
| Option C: | Auto-ignition temperature |
| Option D:  | Flash point |
|  |  |
| Q12.  | Protection layers in LOPA are analogous to the: |
| Option A: | Branches of event tree |
| Option B: | Blocks in reliability block diagram |
| Option C: | Events in fault tree |
| Option D:  | States in markov analysis |
|  |  |
| Q13.  | Quantitative Calculations show that the SIF used in low demand mode achieves a PFDavg of 0.002 then the SIL to this SIF is : |
| Option A: | SIL 4 |
| Option B: | SIL 3 |
| Option C: | SIL 2 |
| Option D:  | SIL 1 |
|  |  |
| Q14. | Hazard matrix considers the following categories: |
| Option A: | Consequence and likelihood components of the risk |
| Option B: | Occupancy and demand rate |
| Option C: | Consequence and occupancy |
| Option D:  | Occupancy and probability of avoiding the hazard |
|  |  |
| Q15. | Risk graph is a method of SIL selection for the-----. |
| Option A: | Safety Instrumentation System |
| Option B: | Logic Solver |
| Option C: | Safety Instrumented Function |
| Option D:  | Sensor and Final Element Assembly |
|  |  |
| Q16. | Width of ALARP triangle indicates:  |
| Option A: | Risk magnitude |
| Option B: | consequence |
| Option C: | Frequency of hazardous occurance |
| Option D:  | Failure rate  |
|  |  |
| Q17. | ALARP involves weighing a risk against : |
| Option A: | Trouble, time and money needed to control it |
| Option B: | Trouble, time and money needed to prevent it |
| Option C: | Trouble, failure and money needed to control it |
| Option D:  | Trouble, time and money needed to prohibit it |
|  |  |
| Q18. | If the risk reduction factor is 80, then which SIL is suitable for SIF? |
| Option A: | SIL1 |
| Option B: | SIL2 |
| Option C: | SIL3 |
| Option D:  | SIL4 |

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