

(3 Hours)

Total Marks: 80

N.B. 1. Question No.01 is compulsory

2. Attempt any Three questions from remaining Five questions

3. Assume suitable data wherever required

1. Answer the following 20
 - a. Explain in detail the need of safety instrumented system.
 - b. What do you understand by operation phase of safety life cycle? Explain.
 - c. Compare process control system and safety control system.
 - d. What is consequence analysis? What are the factors to be considered for good impact consequence analysis?

 2. a. Explain SIL determination using ALARP method. 10
b. What is complimentary event, mutually exclusive event and non mutually exclusive event? Explain. 10

 3. a. Draw and explain the safety life cycle of IEC-61511. 10
b. What is a protection layer? Explain in detail. 10

 4. a. Explain in detail fault propagation modelling for likelihood analysis. 10
b. Write short note on safety instrumented function. 10

 5. a. What is risk matrix? Explain in detail. 10
b. Explain the following terms with respect to consequence analysis:- 10
 - i. Hazards
 - ii. Initiating events
 - iii. Intermediate events
 - iv. Incident
 - v. Incident outcome

 6. a. Compare SIS technology based on relay system and solid state device system. 10
b. Explain in detail the SIL determination using risk graph method. 10
-