SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF

ELECTRONICS AND INSTRUMENTATION ENGINEERING

M.E. Control & Instrumentation Engineering

QUESTION BANK

II SEMESTER

191328 APPLIED INDUSTRIAL INSTRUMENTATION

Regulation – 2019

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Prepared by

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SUBJECT : 191328 APPLIED INDUSTRIAL INSTRUMENTATION

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UNIT I REVIEW OF INDUSTRIAL INSTRUMENTATION			
Overview of measurement of Flow, Level, Temperature and Pressure.			
PART –A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Classify the different temperature measurement types using change in physical properties.	**BTL 2**	**Understand**
2.	Point out the significance of primary standards used in calibrating measuring instruments.	**BTL 4**	**Analyze**
3.	Differentiate between 3-wire RTD and 4-wire RTD.	**BTL 4**	**Analyze**
4.	List out the materials used in thermistors.	**BTL 1**	**Remember**
5.	Mention any three elastic type pressure gauges.	**BTL 2**	**Understand**
6.	Express the different units of pressure.	**BTL 2**	**Understand**
7.	Examine the design pressure of capsule-type pressure sensors.	**BTL 4**	**Analyze**
8.	Distinguish variable head and variable area flow meters.	**BTL 4**	**Analyze**
9.	List out some Electrical type flow meters.	**BTL 1**	**Remember**
10.	Illustrate the factors to be considered while selecting a flow meter.	**BTL 3**	**Apply**
11.	Mention the advantages of Venturi tube over Orifice plate.	**BTL 1**	**Remember**
12.	What are the advantages of float type level measurement?	**BTL 1**	**Remember**
13.	Summarize two commonly used electrical method for measuring liquid level in industries.	**BTL 2**	**Understand**
14.	Generalize the advantages of capacitance level measurement.	**BTL 6**	**Create**
15.	What is DPT? Summarize its use in level measurement.	**BTL 5**	**Evaluate**
16.	Define selectivity and specificity of sensors.	**BTL 1**	**Remember**
17.	What do you mean by calibration? And mention some methods for flow measurement.	**BTL 2**	**Understand**
18.	Define sensitivity &linearity of sensors.	**BTL 1**	**Remember**
19.	Recommend the criteria considered for selection of transducer for a particular application.	**BTL 5**	**Evaluate**
20.	Differentiate static and dynamic calibration.	**BTL 4**	**Analyze**
PART – B			
1.	With neat block diagram explain the principle of fibre optic thermometers. **(13)**	**BTL 1**	**Remember**
2.	Describe the construction, working principle and installation procedure of an orifice meter. **(13)**	**BTL 2**	**Understand**
3.	**(i)** Describe with neat sketch the construction and working of rotameter.**(10)**	**BTL 1**	**Remember**

	(ii)	Discuss the advantages and disadvantages of rotameter.**(3)**	**BTL 2**	**Understand**
4.	Discuss the construction and working of electromagnetic flow meter.**(13)**		**BTL 2**	**Understand**
5.	Examine the features of RTD and also explain the construction and working of RTD. **(13)**		**BTL 4**	**Analyze**
6.	List the non-contact type of level measurement systems. Explain with neat sketch the working and construction of any two of them. **(13)**		**BTL 1**	**Remember**
7.	With neat sketch explain the method of measurement of differential pressure using Capacitive differential pressure sensor. Mention its advantages and disadvantages. **(13)**		**BTL 4**	**Analyze**
8.	Explain the pressure measurement process using the following: **(i)** Bourdon tubes **(4)** **(ii)** Bellows **(4)** **(iii)** Diaphragms **(5)**		**BTL 4**	**Analyze**
9.	With a neat sketch, anlyze how level is measured using nuclear radiations.**(13)**		**BTL 4**	**Analyze**
10.	**(i)**	Illustrate about different types of thermistor with neat sketch. **(7)**	**BTL 3**	**Apply**
	(ii)	Give the merits and demerits of thermistor. **(6)**	**BTL 2**	**Understand**
11.	Explain about the operation and application of ultrasonic level gauge with suitable sketch. **(13)**		**BTL 5**	**Evaluate**
12.	Summarize the various factors to be considered for the selection of sensors.**(13)**		**BTL 5**	**Evaluate**
13.	Discuss about the different types of probes used in capacitive type level measurement. Also illustrate how level of conducting liquid is measured using capacitive type sensor.**(13)**		**BTL 3**	**Apply**
14.	Briefly explain how a Pitot static tube can be used to measure average flow rate. What are the errors associated with measurement of pressure in Pitot tube? Explain.**(13)**		**BTL 5**	**Evaluate**
PART – C				
1.	Evaluate the performances of various electronic thermometers and explain in detail along with its characteristics. **(15)**		**BTL 5**	**Evaluate**
2.	Explain the pressure measurement using any two electronic type pressure sensors.**(15)**		**BTL 5**	**Evaluate**
3.	Evaluate the application areas and constructional details of venturi tubes, flow tubes and flow nozzles, also comment on pressure loss on these systems **(15)**		**BTL 5**	**Evaluate**
4.	Prepare a summary on brief review of various technologies used for level measurement grouped by sensing characteristics. **(15)**		**BTL 5**	**Evaluate**

UNIT II MEASUREMENT IN THERMAL POWER PLANT AND PETROCHEMICAL INDUSTRY			
Selection and Installation of Instruments used for the Measurement of fuel flow, air flow, drum level, steam pressure, steam temperature – Feed water quality measurement – Flow, level, temperature and pressure measurement in Distillation, pyrolysis, catalytic cracking and reforming process			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	What are the primary measurements of power plant?	**BTL 1**	**Remember**
2.	Justify the importance of drum level measurement. How is it taken care of?	**BTL 5**	**Evaluate**
3.	What do you mean by swelling effect of boiler drum level?	**BTL 1**	**Remember**
4.	Illustrate the use of correction factor for temperature accounted during measurement of steam flow?	**BTL 3**	**Apply**
5.	Predict the need of connecting thermocouples in series and parallel during temperature measurement.	**BTL 6**	**Create**
6.	What is pulverized coal?	**BTL 1**	**Remember**
7.	Examine, how flow of coal is measured in power plants?	**BTL 4**	**Analyze**
8.	Identify the various methods of flow measurement for feed water flow in power plants.	**BTL 3**	**Apply**
9.	What are the basic factors to be considered for feed water flow?	**BTL 1**	**Remember**
10.	Summarize the importance of feedwater Analysis.	**BTL 5**	**Evaluate**
11.	Examine the suitability of float type in boiler drum level measurement.	**BTL 4**	**Analyze**
12.	Give the scales used for temperature measurements in power plants.	**BTL 2**	**Understand**
13.	Mention the instruments used to measure feed water temperature?	**BTL 1**	**Remember**
14.	What similarities are there for the CDU with vacuum distillation unit? Also identify the difference.	**BTL 3**	**Apply**
15.	What primary disadvantage exists by using live steam in the CDU columns?	**BTL 1**	**Remember**
16.	What is pyrolysis?	**BTL 1**	**Remember**
17.	Point out the applications of pyrolysis.	**BTL4**	**Analyze**
18.	Compare catalytic cracking with thermal cracking.	**BTL 2**	**Understand**
19.	Assess the need of hydrogen use in the reforming reaction.	**BTL 5**	**Evaluate**
20.	Is reforming a very important process in the refinery? If yes justify.	**BTL 5**	**Evaluate**
Part-B			
1.	Discuss about the selection and installation of instruments for measurement of fuel flow, air flow and drum level in thermal power plant. **(13)**	**BTL 2**	**Understand**
2.	With suitable diagram, explain the principle of Electromagnetic type flow meters. Also mention its advantages and limitations.**(13)**	**BTL 4**	**Analyze**

3.	Classify the transducers based on Low, Medium and High temperature applications? Also list the major temperature measurement points and suggest suitable sensors in thermal power plant. **(13)**		**BTL 3**	**Apply**
4.	Write short notes on (i) Drum level measurement **(6)** (ii) Temperature compensation techniques.**(7)**		**BTL 2**	**Understand**
5.	Discuss about flow measurements involved in power plants.		**BTL 2**	**Understand**
6.	Explain in detail about Steam temperature Measurement.**(13)**		**BTL 4**	**Analyze**
7.	Explain how selection and installation of steam pressure measuring instrument is done? Also explain about steam pressure measurement. **(13)**		**BTL 5**	**Evaluate**
8.	Discuss the temperature measurements in power plants in detail.**(13)**		**BTL 2**	**Understand**
9.	Explain in detail about air flow control system.**(13)**		**BTL 4**	**Analyze**
10.	With conceptual block diagram explain the sequence of operations taking place in the CDU and VDU. **(13)**		**BTL 5**	**Evaluate**
11.	**(i)**	Illustrate about pyrolysis process. **(7)**	**BTL 3**	**Apply**
	(ii)	Point out and explain the necessary process variable measurement associated with pyrolysis process. **(6)**	**BTL 4**	**Analyze**
12.	Demonstrate the significance of measurement of flow, level, pressure and temperature at various locations around the distillation unit.**(13)**		**BTL 3**	**Apply**
13.	**(i)**	What is cracking? How catalytic cracking is different from thermal cracking? **(4)**	**BTL 2**	**Understand**
	(ii)	Describe in detail about catalytic cracking process along with the required operating condition. **(9)**	**BTL 1**	**Remember**
14.	Explain about reforming process along with necessary measurements. **(13)**		**BTL 4**	**Analyze**
PART – C				
1.	Select instruments for measuring steam pressure and steam temperature in thermal power plant and justify. Also explain its working and installation. **(15)**		**BTL 5**	**Evaluate**
2.	Combine Primary and Secondary transducers in Pressure measurement? Explain the pressure measurement of steam in Power plant. **(15)**		**BTL 6**	**Create**
3.	Analyze the need of Air/fuel ratio control? What is meant by the term Oxygen trim control in Boiler? Explain the method of controlling the combustion by Oxygen trim control. **(15)**		**BTL 5**	**Evaluate**
4.	Explain about the types of measuring devices for flow and pressure and recommend location of measurement ofthese variables in a distillation unit.**(15)**		**BTL 5**	**Evaluate**

UNIT III INDUSTRIAL ANALYSER				
Flue gas Oxygen Analyzers- Gas chromatography-dissolved oxygen analyzers- CO, CO_2, and NO_2 monitors- dust monitors – coal analyzer- Hydrocarbon analyzers- oil in or on water – sulphur in oil Analyzer				
PART – A				
Q.No	**Questions**		**BT Level**	**Competence**
1.	Which property of oxygen is utilized in oxygen analyzers?		**BTL 3**	**Apply**
2.	Point out the disadvantages of thermal type oxygen analyzers.		**BTL 4**	**Analyze**
3.	Categorize the electrochemical oxygen detectors.		**BTL 4**	**Analyze**
4.	Summarize the comparison among electrochemical oxygen detectors.		**BTL 5**	**Evaluate**
5.	Name the detectors used for dissolved oxygen measurement.		**BTL 1**	**Remember**
6.	Discuss about basic elements of chromatograph.		**BTL 2**	**Understand**
7.	Write the purpose of Gas chromatography.		**BTL 1**	**Remember**
8.	Recommend the detectors to be used in gas chromatography.		**BTL 5**	**Evaluate**
9.	Define retention time in a chromatograph.		**BTL 1**	**Remember**
10.	List the types of CO analyzer.		**BTL 1**	**Remember**
11.	State the principle of orsat analyzer.		**BTL 1**	**Remember**
12.	Analyze the need of measuring carbon monoxide in flue gas.		**BTL 4**	**Analyze**
13.	Identify the methods to estimate Nitrogen-oxides present in air.		**BTL 3**	**Apply**
14.	Point out few gas pollutants.		**BTL 4**	**Analyze**
15.	Show a typical diagram of the system used to measure dust particles.		**BTL 3**	**Apply**
16.	Demonstrate the principle of dust measurement in exhaust.		**BTL 3**	**Apply**
17.	Outline how carbon-monoxide in the air is monitored?		**BTL 2**	**Understand**
18.	List the analyzers used for oil-on water measurement.		**BTL 1**	**Remember**
19.	Discover the applications of oil-in water and sulphur in-oil analyzer?		**BTL 3**	**Apply**
20.	Predict the importance of monitoring the characteristics of coal.		**BTL 2**	**Understand**
PART – B				
1.	Demonstrate the working principle of deflection type and dual gas type paramagnetic oxygen analyzer with a functional diagram. **(13)**		**BTL 3**	**Apply**
2.	Describe the different stages of Gas Chromatography in the separation of two phases with schematic diagram.**(13)**		**BTL 1**	**Remember**
3.	Mention the methods used for analyzing dissolved oxygen and describe about any two methods. **(13)**		**BTL 1**	**Remember**
4.	**(i)**	Explain how CO level in air is estimated using NDIR analyzer with relevant diagrams. **(10)**	**BTL 5**	**Evaluate**

	(ii)	Discuss about the merits and limitations of any three types of CO analyzers. **(3)**	**BTL 2**	**Understand**
5.	**(i)**	Analyze how to estimate the amount of hydrocarbons present in air with neat instrumentation setup. **(7)**	**BTL 4**	**Analyze**
	(ii)	Give short notes on air pollution due to carbon monoxide, nitrogen oxide and hydrocarbons. **(6)**	**BTL 3**	**Apply**
6.	Explain the determination of NO_2 using following colorimetric methods (i) Griess–Saltzman method**(7)** (ii) Jacobs–Hochheiser method **(6)**		**BTL 4**	**Analyze**
7.	Describe the constructional details and working of a dust monitor. **(13)**		**BTL 1**	**Remember**
8.	Explain oxygen detection using high temperature current mode O_2 detector and electrochemical O_2 detector. **(13)**		**BTL 4**	**Analyze**
9.	**(i)**	Why coal analyzer is needed? Explain how coal is analyzed using thermogravimetry coal analyzer. **(10)**	**BTL 5**	**Evaluate**
	(ii)	Is carbon dioxide measurement in ambient air is important? If yes justify. And also list the types of sensors used for its measurement. **(3)**	**BTL 4**	**Analyze**
10.	Discuss about radio frequency sensors, conductivity and capacitance sensors, Ultrasonic sensors and Nuclear sensors that can be used for water-in-oil detection. **(13)**		**BTL 2**	**Understand**
11.	**(i)**	Compose the consequences of air pollution.**(7)**	**BTL 6**	**Create**
	(ii)	Discuss about oxygen analyzer using zirconium oxidefuel cells. **(13)**	**BTL 2**	**Understand**
12.	**(i)**	Explain how oil-water interface is detected using radio frequency sensor? **(7)**	**BTL 5**	**Evaluate**
	(ii)	Explain the operation of capacitance type water-in-oil detector with neat diagram. **(6)**	**BTL 4**	**Analyze**
13.	Illustrate how oil-in-water can be detected in upflow sample stream and in falling sample stream using UV radiation. **(13)**		**BTL 3**	**Apply**
14.	Demonstrate how sulphur in oil is analyzed using x-ray absorption type sulphur-in-oil analyzer. **(13)**		**BTL 3**	**Apply**
PART – C				
1.	Explain how dissolved oxygen can be estimated using polarographic cell method and galvanic cell method. **(15)**		**BTL 5**	**Evaluate**
2.	**(i)**	Summarize the necessity of O_2 analysis and explain how it is performed using thermal type paramagnetic O_2analyzer. **(10)**	**BTL 5**	**Evaluate**
	(ii)	Analyze about green house gases and conclude about its effect on the environment. **(5)**	**BTL 6**	**Create**
3.	Explain determination of oil-in-water using ultraviolet oil-in-water analyzer with automatic zero feature using relevant diagram. **(15)**		**BTL 5**	**Evaluate**
4.	Examine the impact of oil- on- water over freshwater and marine ecosystem. Discuss the method available to detect oil-on-water and also explain how its thickness can be measured. **(15)**		**BTL 5**	**Evaluate**

UNIT-IV INSTRUMENTATION FOR INDUSTRIAL SAFETY			
Electrical and Intrinsic safety – Explosion suppression and Deluge systems – Conservation and emergency vents – Flame, fire and smoke detectors – Leak detectors – Metal detectors			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Mention three fundamental factors that safety depends on.	**BTL 1**	**Remember**
2.	Write the three ways through which electricity can kill or cause injury. Also mention the range of fuse used to protect the wiring and the instrument.	**BTL 2**	**Understand**
3.	Mention the types of devices used for electrical and intrinsic safety.	**BTL 1**	**Remember**
4.	Point out the protection methods for preventing explosion hazards.	**BTL 4**	**Analyze**
5.	Inspect the hardware units present in explosion suppression system and mention its purpose.	**BTL 4**	**Analyze**
6.	Give the categories of flame behaviour.	**BTL 2**	**Understand**
7.	List the compounds that can be used as explosion suppressants.	**BTL 1**	**Remember**
8.	Compare explosion suppression system with ultra high speed Delgue system.	**BTL 2**	**Understand**
9.	Recommend the types of vents used in tank design.	**BTL 5**	**Evaluate**
10.	Define flash point of liquid.	**BTL 1**	**Remember**
11.	Why inert gas blanket is required in storage tank? Which type of vent can be used to produce this?	**BTL 5**	**Evaluate**
12.	When conservation vents are recommended to use?	**BTL 3**	**Apply**
13.	Discuss about emergency vents used in storage tank.	**BTL 2**	**Understand**
14.	Give the merits and demerits of UV type flame detector?	**BTL 2**	**Understand**
15.	Quote the types of optical flame sensor.	**BTL 1**	**Remember**
16.	Write the characteristics of flame that is used to detect the presence of flame.	**BTL 5**	**Evaluate**
17.	Examine the energy spectrum covered by flame radiation.	**BTL 4**	**Analyze**
18.	Identify the detector options used for leak detection in large containers and small parts.	**BTL 3**	**Apply**
19.	Mention any five gases that can be detected by thermal conductivity-type leak detector along with its minimum detectable leak rate.	**BTL 1**	**Remember**
20.	Point out the applications of metal detectors?	**BTL 4**	**Analyze**
PART – B			
1.	Explain NEMA ICS “Industrial control” recommended types of enclosures for live parts that ensure electrical safety. **(13)**	**BTL 4**	**Analyze**
2.	Discuss about the concept of grounding, personnel safety and energy levels with reference to electrical safety. **(13)**	**BTL 2**	**Understand**
3.	Explain about the devices which serve to discern the initiation of the explosion and also about the unit which initiate the corrective action in explosion suppression system. **(13)**	**BTL 4**	**Analyze**

4.	**(i)**	How NEC defines intrinsic safety? **(3)**	**BTL 1**	**Remember**
	(ii)	Discuss the following with reference to intrinsic safety (a) Energy levels **(2)** (b) Certification of intrinsic safety **(8)**	**BTL 2**	**Understand**
5.	Examine the purpose of actuated devices in explosion suppression system? Explain the functioning of these devices with necessary diagram. **(13)**		**BTL 3**	**Apply**
6.	**(i)**	Give the applications of explosion suppression system. Also explain the cases where these systems will not work. **(5)**	**BTL 2**	**Understand**
	(ii)	Describe the installation of flame sensors for safe operation of burner management system with neat diagram. **(8)**	**BTL 2**	**Understand**
7.	By what factors ultra-high-speed deluge (UHSD) system differs from explosion suppression system. Explain the functioning of UHSD system with neat diagram. **(13)**		**BTL 4**	**Analyze**
8.	Explain about the purpose, implementation and functioning of (i) Conservation vents **(9)** (ii) Emergency vents **(4)**		**BTL 5**	**Evaluate**
9.	**(i)**	Write short notes on smoke detectors and thermal sensors. **(7)**	**BTL 1**	**Remember**
	(ii)	Discuss the rectification phenomenon utilized in detecting electrical conduction characteristic of flame.**(6)**	**BTL 3**	**Apply**
10.	**(i)**	Demonstrate the occurrence of fire in four different phases. **(4)**	**BTL 3**	**Apply**
	(ii)	Discuss about heat sensors and conduction-type detectors used in flame detection. **(9)**	**BTL 2**	**Understand**
11.	Indicate the methods of detecting radiation characteristic of flame in UV, visible and IR wavelength and explain. **(13)**		**BTL 4**	**Analyze**
12.	Summarize the features (both advantageous and disadvantageous) of various flame guard sensors along with their comparison. **(13)**		**BTL 5**	**Evaluate**
13.	Explain how halogen detectors are used in aboveground leak detection system? **(13)**		**BTL 4**	**Analyze**
14.	Discuss about the types of metal detectors. Explain how these detectors are installed on conveyor belts for detecting metal objects. **(13)**		**BTL 4**	**Analyze**
PART – C				
1.	Justify, how purging, pressurization or venting ensure safe implementation of tight enclosure of any size. **(15)**		**BTL 5**	**Evaluate**
2.	Explain about criteria considered for selecting flame detector. Also explain in detail about its operation, features and demerits of five basic types of optical flame sensor. **(15)**		**BTL 5**	**Evaluate**

3.	**(i)**	Determine how suppression works in explosion suppression system. **(6)**	**BTL 5**	**Evaluate**
	(ii)	Evaluate the explosion characteristics of various materials. **(5)**		
	(iii)	How suppressant chemicals help in suppressing explosion? **(4)**		
4.	Justify the necessity of underground leak detection system and explain principle employed in level monitoring type and soil detector type underground leakage detection with necessary diagrams. **(15)**		**BTL 6**	**Create**

UNIT-V SAFETY INSTRUMENTATION			
Introduction to Safety Instrumented Systems – Hazards and Risk – Process Hazards Analysis (PHA)– Safety Life Cycle – Control and Safety Systems - Safety Instrumented Function - Safety Integrity Level (SIL) – Selection, Verification and Validation			
PART – A			
Q.No	**Questions**	**BT Level**	**Competency**
1.	Give the applications of Safety instrumented systems (SIS)	**BTL 2**	**Understand**
2.	What is the principle behind safety standards?	**BTL 1**	**Remember**
3.	Analyze the safety life cycle of Safety instrumented systems (SIS).	**BTL 4**	**Analyze**
4.	Give the different definitions of hazard	**BTL 2**	**Understand**
5.	Point out the different risks involved in a system.	**BTL 4**	**Analyze**
6.	Discuss about the types of hazards.	**BTL 2**	**Understand**
7.	Interpret the meaning of different risk level.	**BTL 5**	**Evaluate**
8.	Evaluate the purpose of Preliminary Hazard Analysis (PHA).	**BTL 5**	**Evaluate**
9.	List out some major sources of hazards.	**BTL 1**	**Remember**
10.	Identify the three phases of safety life cycle?	**BTL 3**	**Apply**
11.	Differentiate safety standards IEC 61508 and IEC 61511	**BTL 2**	**Understand**
12.	Define the terms Safety Instrumented system and Safety instrumented Function.	**BTL 1**	**Remember**
13.	Draw the typical diagram showing risk reduction methods.	**BTL 1**	**Remember**
14.	Illustrate the importance of SIL selection.	**BTL 3**	**Apply**
15.	What is meant by SIL verification?	**BTL 1**	**Remember**
16.	Point out the issues addressed by safety integrity level (SIL).	**BTL 4**	**Analyze**
17.	What is HFT? And examine its significance.	**BTL 4**	**Analyze**
18.	Define validation in safety instrumented system.	**BTL 1**	**Remember**
19.	Summarize the techniques used to determine SIL?	**BTL 5**	**Evaluate**
20.	Evaluate how selection, verification and validation are related in SIL	**BTL 5**	**Evaluate**
PART – B			
1.	Analyze the different definitions of Hazard and Risk. **(13)**	**BTL 4**	**Analyze**
2.	Discuss the applications of risk register, risk matrix and risk ranking. **(13)**	**BTL 2**	**Understand**
3.	Explain the relationship of vulnerability with risk management also discuss about vulnerability ratings. **(13)**	**BTL 4**	**Analyze**

4.	Define the terms PHA, FMEA and HAZOP and compare the concepts of each. **(13)**		**BTL 3**	**Apply**
5.	Discuss about types of risks and prescribe some control measures.**(13)**		**BTL 6**	**Create**
6.	Explain in detail the role of Plant Hazard Analysis by giving the PHA process diagram. **(13)**		**BTL 4**	**Analyze**
7.	**(i)**	Write short notes on Risk register. **(7)**	**BTL 1**	**Remember**
	(ii)	Explain the function of risk matrix. **(6)**	**BTL 4**	**Analyze**
8.	Illustrate the features and concepts of safety standards IEC 61508 and IEC 61511. **(13)**		**BTL 3**	**Apply**
9.	Explain in detail about different phases of safety Life Cycle. **(13)**		**BTL 4**	**Remember**
10.	Evaluate the functional aspects of Safety Instrumented system and Safety instrumented Function.**(13)**		**BTL 5**	**Evaluate**
11.	Discuss in detail about SIL methods.**(13)**		**BTL 2**	**Understand**
12.	**(i)**	Develop a short note on SIL in Safety Life Cycle. **(7)**	**BTL 6**	**Create**
	(ii)	Develop a short note on Risk Reduction and SIL **(6)**	**BTL 6**	**Create**
13.	Illustrate any two SIL determination techniques. **(13)**		**BTL 3**	**Apply**
14.	Explain the process of SIL selection, verification and validation. **(13)**		**BTL 5**	**Evaluate**
	PART – C			
1.	Write your interpretation in detail on the meaning and the steps involved in HAZID.**(15)**		**BTL 5**	**Evaluate**
2.	Evaluate the safety instrumentation systems applied in different levels of nuclear power plants. **(15)**		**BTL 5**	**Evaluate**
3.	Create a Safety Instrumented System (SIS) for different units of fossil fuel power plants.**(15)**		**BTL 6**	**Create**
4.	Explain about safety instrumentation in oil and gas industries. **(15)**		**BTL 5**	**Evaluate**