SRM VALLIAMMAI ENGINEERING COLLEGE

An Autonomous Institution
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF
ELECTRONICS AND INSTRUMENTATION ENGINEERING

QUESTION BANK

VI SEMESTER

1907605 – ADVANCED INSTRUMENTATION SYSTEMS

Regulation – 2019

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SUBJECT: 1907605 – ADVANCED INSTRUMENTATION SYSTEMS

SEM / YEAR: VI / III

UNIT I - MEASUREMENT OF PROCESS PARAMETERS				
SYLLABUS Review the various Measurement techniques of temperature, pressure, flow and level – application - selection of sensors– calibration methods.				
PART –A				
Q.No	**Questions**	**BT Level**	**Competence**	**COs**
1.	List the sources of error in filled in system thermometer.	BTL 1	Remember	CO1
2.	What are the primary standards for temperature measuring calibration?	BTL 2	Understand	CO1
3.	Define boiling point, freezing point and triple point. Explain Peltier effect.	BTL 1	Remember	CO1
4.	Point out the operation of optical pyrometer.	BTL 2	Understand	CO1
5.	List the transducer used for measuring low pressure.	BTL 1	Remember	CO1
6.	Tabulate the difference between absolute pressure and gauge pressure	BTL 2	Understand	CO1
7.	What is a dead weight tester?	BTL 2	Understand	CO1
8.	Express the different units of pressure.	BTL 2	Understand	CO1
9.	Mention any three elastic type pressure gauges.	BTL 2	Understand	CO1
10.	Explain turbulent flow.	BTL 2	Understand	CO1
11.	What is laminar flow?	BTL 2	Understand	CO1
12.	List the different units of flow.	BTL 1	Remember	CO1
13.	What is Coriolis effect?	BTL 2	Understand	CO1
14.	What are the applications of rotameter?	BTL 2	Understand	CO1
15.	Explain Doppler Effect.	BTL 2	Understand	CO1
16.	Compare between float and displacer.	BTL 2	Understand	CO1
17.	Compare between float and displacer.	BTL 2	Understand	CO1
18.	Define purge level system.	BTL 2	Understand	CO1
19.	Discuss about the any one type of capacitor probe.	BTL 2	Understand	CO1
20.	Draw the tilt switch arrangement for measurement of level for liquid and solid.	BTL 2	Understand	CO1
21.	What is a float switch?	BTL 2	Understand	CO1
22.	What is the type calibration?	BTL 2	Understand	CO1
23.	List the points to be considered while selection of sensors.	BTL 1	Remember	CO1
24.	Define direct calibration.	BTL 1	Remember	CO1
PART – B				

1.	**(i)**	Demonstrate the different types of thermocouple with necessary specification.	BTL 4	Analyse	CO1
	(ii)	Explain in detail about the cold junction compensation used in thermocouple**.**			
2.	Explain the construction and working principle of Total radiation pyrometer.		BTL 4	Analyse	CO1
3.	**(i)**	Elaborate how the fiber optic temperature measurement is advantageous than other methods?	BTL 4	Analyse	CO1
	(ii)	Explain in detail about the RTD 4 wire system.			
4.	**(i)**	Demonstrate about the Junction Semiconductor Sensors.	BTL 3	Apply	CO1
	(ii)	Demonstrate about the Digital Thermometers.			
5.	Describe the pressure measurement process using the following. (i) Bourdon tubes (ii) Bellows (iii) Diaphragm		BTL 3	Apply	CO1
6.	**(i)**	With neat sketch describe the method of measurement differential pressure using Capacitive differential pressure sensor. Mention its advantages and disadvantages.	BTL 3	Apply	CO1
	(ii)	Describe the methods of pressure measurement using pirani gauge.			
7.	Describe the methods of measurement of pressure using thermal conductivity gauges and ionization gauge.		BTL 3	Apply	CO1
8.	Demonstrate how a Dead weight tester is used to calibrate Pressure measuring device and mention the factors affecting the accuracy of Dead weight Tester.		BTL 3	Apply	CO1
9.	Distinguish variable head and variable area flow meters. Explain the working principle of any one type of variable head flow meter with neat sketch.		BTL 4	Analyse	CO1
10.	Describe with neat sketch any two closed channel flow meter.		BTL 3	Apply	CO1
11.	Explain the principle operation of Thermal mass flow meter with neat sketch.		BTL 4	Analyse	CO1
12.	Compose the method of variable area measurement using necessary equations and diagrams for measuring liquid flow rate.		BTL3	Apply	CO1
13.	**(i)**	Explain the working of ultrasonic flow meter.	BTL 4	Analyse	CO1
	(ii)	Explain about the Electromagnetic flow meters.			
14.	**(i)**	Explain three element boiler drum level control.	BTL 4	Analyse	CO1
	(ii)	Explain need for ultrasonic method of level measurements with diagram and its applications**.**			
15.	Describe the principle of capacitance level measurement and discuss about any one type of capacitance probe.		BTL 3	Apply	CO1
16.	Explain the selection of sensors in process industry.		BTL 4	Analyse	CO1
17.	Describe the various types of calibration methods.		BTL 3	Apply	CO1

PART – C				
1.	Describe any one methods for measurement of high temperature measurement.	BTL5	Evaluate	CO1
2.	Explain how McLeod gauge used for low pressure measurement. Justify this with your answer .	BTL5	Evaluate	CO1
3.	Investigate about the high flow rate measurement device and explain its working in detail	BTL6	Create	CO1
4.	Nuclear level instruments provide point and continuous level measurement. Support the statement using necessary sketches.	BTL6	Create	CO1
5.	How to select the sensor for the specific application industry.	BTL6	Create	CO1

UNIT II - INSTRUMENTS FOR ANALYSIS

SYLLABUS

Ion selective electrodes, Gas & Liquid Chromatography - Oxygen analyzers for gas and liquid – CO,CO2, NO and SO Analyzers- Hydrocarbon and HS Analyzers – Dust Analyzers, smoke Analyzers, Toxic gas Analyzers and radiation monitoring.

PART – A

Q.No.	Questions	BT Level	Competence	COs
1.	Name the different types of electrodes.	BTL1	Remember	CO2
2.	Show the advantages of Ion selective electrodes.	BTL2	Understand	CO2
3.	List out the advantages of Hydrogen electrodes.	BTL1	Remember	CO2
4.	Write the Nernst equation.	BTL2	Understand	CO2
5.	Difference Between pH and Other Ion-Selective Electrodes	BTL1	Remember	CO2
6.	List the classification of four major groups ISEs.	BTL1	Remember	CO2
7.	Write the Problems with ISE Measurements.	BTL2	Understand	CO2
8.	Identify the methods to estimate Nitrogen-oxides present in air.	BTL2	Understand	CO2
9.	What is the principle of H2S analyzer?	BTL2	Understand	CO2
10.	Define thermal conductivity analyzer.	BTL1	Remember	CO2
11.	List a few types of Gas analyzers.	BTL1	Remember	CO2
12.	Write about the principle of Smoke meter.	BTL2	Understand	CO2
13.	List the properties of Gas used for the measurement of quantity.	BTL1	Remember	CO2
14.	What is the principle of Dust measurement in Thermal power plant?	BTL2	Understand	CO2
15.	What is the need of measuring carbon monoxide in flue gas?	BTL2	Understand	CO2
16.	Write the applications of conductivity analyzer.	BTL2	Understand	CO2
17.	What is the principle behind IR analyzer?	BTL2	Understand	CO2
18.	Write the need for sulphur dioxide estimation.	BTL2	Understand	CO2
19.	Demonstrate the principle Smoke density measurement in Exhaust.	BTL2	Understand	CO2
20.	Write the applications of IR gas analyzer.	BTL2	Understand	CO2

21.	Where are the electrochemical sensors used?		BTL2	Understand	CO2
22.	How is nitrogen-di-oxide prepared by chemiluminescence?		BTL2	Understand	CO2
23.	What the use of gold films in Hydrogen Sulfide analyser?		BTL2	Understand	CO2
24.	Draw a typical diagram to measure dust particles.		BTL1	Remember	CO2
	PART – B				
1.	**(i)**	Estimate CO level in air and how it can be analysed using NDIR analyzer with relevant diagrams.	BTL3	Apply	CO2
	(ii)	Compose the consequences of air pollution.			
2.	Explain the principle of measurement of specific ions using ion-selective electrodes		BTL4	Analyse	CO2
3.	Explain concept of using electrode for hydrophobic gas-permeable membrane to separate the sample solution from the electrode internal solution.		BTL4	Analyse	CO2
4.	Explain the Basic Parts of a Gas Chromatograph.		BTL4	Analyse	CO2
5.	With near sketches , working of Gas Chromatography–Infrared Spectroscopy.		BTL3	Apply	CO2
6.	Explain any one Types of Liquid Chromatography.		BTL4	Analyse	CO2
7.	Estimate CO level in air and how it can be analysed using NDIR analyzer with relevant diagrams.		BTL3	Apply	CO2
8.	Describe the arrangement of magnets in paramagnetic oxygen analyser.		BTL3	Apply	CO2
9.	Elaborate the working principle and operation of magnetic wind instruments.		BTL3	Apply	CO2
10.	Discuss about the infrared gas analysers.		BTL4	Analyse	CO2
11.	Draw the schematic diagram Non-dispersive Infrared Analyser and explain its operation.		BTL3	Apply	CO2
12.	Explain any technique for measurement of sulphur oxides in industry pollutants.		BTL4	Analyse	CO2
13.	Draw and explain the Schematic diagram of a measuring system for hydrocarbons based on flame ionisation detection principle.		BTL3	Apply	CO2
14.	Explain the conductometric method used dfor trace gas analysis.		BTL4	Analyse	CO2
15.	Explain the operation of laser diffraction particle sizing		BTL4	Analyse	CO2
16.	**(i)**	How do we define particle size?	BTL4	Analyse	CO2
	(ii)	Which particle properties are important to measure?			
17.	**(i)**	Explain working and principle operation of any one type smoke meters.	BTL4	Analyse	CO2
	(ii)	Explain working and principle operation of toxi gas analyzer.			
	PART – C				
1.	Describe the principle operation of High Pressure Liquid Chromatograph.		BTL5	Evaluate	CO 2
2.	With neat sketches explain the principle of infrared gas analyser.		BTL6	Create	CO 2
3.	With a block diagram, propose the method of measuring carbon monoxide using Non-Dispersive Infrared Analyzer		BTL6	Create	CO 2
4.	Describe the working of an analyzer that can be used to estimate the content of NO_2 and SO_2 in a gas, also assess the working of Dust monitor.		BTL5	Evaluate	CO 2

5.	With a schematic diagram, explain the method of analyzing various flue gas content in smoke using Hot wire thermal conductivity analyzer.	BTL6	Create	CO 2

UNIT III - SAFETY INSTRUMENTATION				
SYLLABUS 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**	**Competence**	**COs**
1.	Why do need an SIS?	BTL2	Understand	CO3
2.	What is an SIS?	BTL2	Understand	CO3
3.	Why develop SIS standards?	BTL2	Understand	CO3
4.	What does the standard require?	BTL2	Understand	CO3
5.	List the Common Sources of Hazards.	BTL1	Remember	CO3
6.	List the Information Related to Hazard Identification.	BTL1	Remember	CO3
7.	Define hazard.	BTL1	Remember	CO3
8.	Define hazard as per CCPS.	BTL1	Remember	CO3
9.	List the major points to be covered in hazard identifications.	BTL1	Remember	CO3
10.	Define risk.	BTL1	Remember	CO3
11.	What are the points are considered in PHA.	BTL2	Understand	CO3
12.	Expand ALARP.	BTL2	Understand	CO3
13.	Define BPCS	BTL1	Remember	CO3
14.	Write the examples of PHA	BTL2	Remember	CO3
15.	Define SIF	BTL1	Remember	CO3
16.	Summarize the Various plant hazard analysis (PHA) techniques.	BTL2	Understand	CO3
17.	What is meant by Functional Safety?	BTL2	Understand	CO3
18.	What is meant by PHA.	BTL2	Understand	CO3
19.	Define SIS	BTL1	Remember	CO3
20.	What are the Influencing PHA Method Selections.	BTL2	Understand	CO3
21.	What is HAZOP?	BTL2	Understand	CO3
22.	Define Preliminary Hazard List.	BTL1	Remember	CO3
23.	What is HAZID?	BTL1	Remember	CO3
24.	Define SIL.	BTL1	Remember	CO3
1.	Demonstrates how Safety Instrumented Systems are different from Basic Process Control Systems, or the BPCS**.(13)**	BTL3	Apply	CO3
2.	Discuss about the risk ranking method. **(13)**	BTL4	Analyse	CO3
3.	**(i)** Write the major Issues and Coverage of Hazard Identification.**(8)**	BTL4	Analyse	CO3
	(ii) Write the hazard Types and in detail. **(5)**			
4.	Discuss about the risk ranking method. **(13)**	BTL1	BTL4	Analyse
5.	Describe the Risk Discussions and its components.**(13)**	BTL4	BTL3	Apply
6.	Describe the Process Hazards Analysis with neat sketches. **(13)**	BTL3	Apply	CO3

7.	Describe about the ALARP in detail		BTL3	Apply	CO3
8.	Describe the Safety Integrity Level Selection with neat sketches. **(13)**		BTL3	Apply	CO3
9.	**(i)**	Describe about the software related SIS Issues. **(6)**	BTL3	Apply	CO3
	(ii)	Describe about the hardware related SIS Issues.**(7)**			
10.	With neat diagram , discuss thehazard identification (hazid) and risk estimate. **(13)**		BTL3	Apply	CO3
11.	Describe the Safety Integrity Level verification with neat sketches. **(13)**		BTL3	Apply	CO3
12.	**(i)**	Discuss about the functional safety. **(5)**	BTL4	Analyse	CO3
	(ii)	Write the basics scope of PHA. **(8)**			
13.	Discuss the FMEA in detail.**(13)**		BTL2	BTL4	Analyse
14.	Explain about the objective of the SRS is to define both functional and performance related requirements for the SRS.**(13)**		BTL4	Analyse	CO3
15.	**(i)**	Elaborate the role of pre-startup acceptance testing in SIL.(**7**)	BTL3	Apply	CO3
	(ii)	Elaborate the role of operations and maintenance in SIL.**(6)**			
16.	Describe about the any one Guided word hazard techniques.**13)**		BTL3	Apply	CO3
17.	**(i)**	BTL3	BTL3	Apply	CO3
	(ii)	Elaborate the role of Construction, Installation, and Commissioning in SIL. **(8)**			
	PART – C				
1.	In process industries with respect to scenarios where SIS failure contributed, what are several common themes developed? **(15)**		BTL6	Create	CO3
2.	Elaborate the specific steps from design through operation, maintenance, testing,and even decommissioning, to address safety throughout the lifetime of a Safety Instrumented System in the petroleum or chemical process.**(15)**		BTL6	Create	CO3
3.	Describe the basic term in Plant hazard analysis and SIS.**(15)**		BTL5	Evaluate	CO3
4.	**(i)**	Explain about th Major Issues and Coverage of Hazard Identification. **(8)**	BTL5	Evaluate	CO3
	(ii)	Describe the conceptual process design. **(8)**			
5.	Discuss in detail about the plant hazard assessment stages.		BTL5	Evaluate	CO3
	(i)	Write the typical output expected of PHA. **(5)**			
	(ii)	Explain the various plant hazard analysis methods. **(10)**			

UNIT IV - INSTRUMENTATION STANDARDS				
SYLLABUS Instrumentation Standards - significance of codes and standards – overview of various types - Introduction of various Instrumentation standards – review, interpretation and significance of specific standards - examples of usage of standards on specific applications.				
PART-A				
Q.No	**Questions**	**BT Level**	**Competence**	**COs**

1.	Define instrument standards.	BTL1	Remember	CO4
2.	Summarize the significance of codes.	BTL2	Understand	CO4
3.	List the significance of standards.	BTL1	Remember	CO4
4.	Write the different type of standards.	BTL2	Understand	CO4
5.	Expand ANSI.	BTL2	Understand	CO4
6.	Write about the ISA-5.1.	BTL2	Understand	CO4
7.	Expand ISA.	BTL2	Understand	CO4
8.	Write about the ISA-101.01	BTL2	Understand	CO4
9.	Write several codes and standards published by the NFPA .	BTL2	Understand	CO4
10.	Write several codes and standards published by the NEC .	BTL2	Understand	CO4
11.	List some NFPA standards.	BTL1	Remember	CO4
12.	What does “Zone 2” mean?	BTL2	Understand	CO4
13.	Write the the history and scope of ATEX?	BTL2	Understand	CO4
14.	Define “Equipment Category”?	BTL1	Remember	CO4
15.	List some API standards	BTL1	Remember	CO4
16.	What does “Non-Sparking” mean?	BTL2	Understand	CO4
17.	What is the minimum IP (Ingress Protection) requirement to comply with ATEX?	BTL2	Understand	CO4
18.	Write the size specifications for NEMA enclosures?	BTL2	Understand	CO4
19.	Are NEMA enclosures rated for arc flash?	BTL2	Understand	CO4
20.	List some API standards.	BTL1	Remember	CO4
21.	What about temperature codes?.	BTL2	Understand	CO4
22.	List some NEC standards.	BTL1	Remember	CO4
23.	Expand ASME.	BTL2	Understand	CO4
24.	List some IEEE standards.	BTL1	Remember	CO4
	PART – B			
1.	Discuss about the Instrumentation standards and code.**(13)**	BTL4	Analyze	CO4
2.	**(i)** Write the Benefits of standard.**(7)**	BTL1	Remember	CO4
	(ii) Why Technical Standards are Important? **(6)**			
3.	Describe the different types of Standards for Instrumentation and Controls Engineers.**(13)**	BTL3	Apply	CO4
4.	Discuss about the API recommended practice 554 for functional process instrumentation, control and information Network architecture.**(13)**	BTL4	Analyse	CO4
5.	**(i)** Who are the Code and Standard Organizations? **(7)**	BTL3	Analyse	CO4
	(ii) List some API standards.**(6)**			
6.	Elaborate the recommended practice for installation of the flow instruments. **(13)**	BTL3	Apply	CO4
7.	Elaborate the recommended practice for installation of the level instruments. **(13)**	BTL3	Apply	CO4
8.	Elaborate the recommended practice for installation of the temperature instruments.**(13)**	BTL3	Apply	CO4
9.	Elaborate the recommended practice for installation of the Pressure instruments. **(13)**	BTL3	Apply	CO4

10.	Describe the performance requirements and considerations for the selection, specification, installation and testing of process instrumentation and control systems. **(13)**	BTL3	Apply	CO4
11.	Discus about the P&ID instrumentation standards. **(13)**	BTL4	Analyse	CO4
12.	**(i)** List the NEC and IEEE Wiring, standards. **(7)**	BTL4	Analyse	CO4
	(ii) Summarize the instrumentation specification standards. **(6)**			
13.	Discuss about the standard for safety instrumentation system. **(13)**	BTL2	BTL4	Analyse
14.	**(i)** Explain IP55, IP66, IP67 standards.**(13)**	BTL3	Analyse	CO4
	(ii) Explain 3, 3S, 3X, 3R, 4, 4X NEMA standards .**(13)**			
15.	Descibe about the Standards - ANSI/ISA-75.01.01 -2002 (60534-2-1 Mod)- Flow Equations for Sizing control Valves. **(13)**	BTL3	Apply	CO4
16.	Explain Zone vs Class / Division. **(13)**	BTL4	Analyse	CO4
17.	Discuss about the International and National Standards organization.**(13)**	BTL2	Understand	CO4
PART-C				
1.	Describe the ISA codes for process instrumentation.**(15)**	BTL5	Evaluate	CO4
2.	Explain about the hazardous area zone classification.**(15)**	BTL5	Evaluate	CO4
3.	Describe the instrumentation cables testing standards.**(15)**	BTL5	Evaluate	CO4
4.	Describe about the list of valve standards.**(15)**	BTL5	Evaluate	CO4
5.	With neat sketches, explain some common symbols used in fluid power system.**(15)**	BTL6	Create	CO4

UNIT V - DOCUMENTATION IN PROCESS INDUSTRIES

SYLLABUS

Block Diagram of a Typical Process – Instrumentation Symbols, Abbreviations and Identification for Instruments: - Mechanical Equipment, Electrical Equipment, Instruments and Automation Systems -Process Flow Diagram (PFD) – Piping and Instrumentation Diagram (P&ID) -Instrument Lists and Specification – Logic Diagrams – Instrument Loop Diagrams - Instrument Hookup Diagrams –Location Plans for Instruments - Cable Routing Diagrams – Typical Control / Rack Rooms Layout –Vendors Documents and Drawings

PART – A

Q.No	Questions	BT Level	Competence	COs
1.	Define the term Accessible in instrument symbol.	BTL2	Understand	CO5
2.	What is meant by Computing device.	BTL2	Understand	CO5
3.	Write some examples for typical tag number.	BTL2	Understand	CO5
4.	Define functional identification.	BTL1	Remember	CO5
5.	Write some examples for expanded typical tag number.	BTL2	Understand	CO5
6.	What is meant by loop identification?	BTL2	Understand	CO5
7.	List some identification letter as first letter.	BTL1	Remember	CO5
8.	List some identification letter as seconf letter.	BTL1	Remember	CO5
9.	Draw few instrument line symbols.	BTL2	Understand	CO5

10.	Draw few instrument or function symbols.	BTL2	Understand	CO5
11.	Draw few Control valve body symbols.	BTL2	Understand	CO5
12.	Define P&ID.	BTL1	Remember	CO5
13.	What is meant by process flow diagram.	BTL2	Understand	CO5
14.	Write the necessity logical diagram.	BTL2	Understand	CO5
15.	What are the major role of Instrument Hookup Diagrams.	BTL2	Understand	CO5
16.	Write basic parts of instrument loop diagram.	BTL2	Understand	CO5
17.	List some instrument and specification.	BTL1	Remember	CO5
18.	Draw any two actuator symbols.	BTL2	Understand	CO5
19.	What is meant primary element symbols?	BTL2	Understand	CO5
20.	Define cable routing.	BTL1	Remember	CO5
21.	Write about the typical control / rack rooms layout.	BTL2	Understand	CO5
22.	Define instrument location layout.	BTL1	Remember	CO5
23.	What are the details in the instrument location layout?	BTL2	Understand	CO5
24.	What are the reference documents for instrument layout preparation?	BTL2	Understand	CO5

PART B

1.	Write the Key elements of effective process documentation.**(13)**	BTL4	Analyse	CO5
2.	Describe the identification system guidelines. **(13)**	BTL3	Apply	CO5
3.	Formulate the table for Identification Letters ISA S5.1First Letters.**(13)**	BTL3	Apply	CO5
4.	Draw and explain the P&ID loop schematic.**(13)**	BTL3	Apply	CO5
5.	Draw and explain the Functional instrument diagram.**(13)**	BTL3	Apply	CO5
6.	Elaborate the overview of Control and Instrumentation Documentation .**(13)**	BTL3	Apply	CO5
7.	With neat sketches and explain the Process flow diagram. **(13)**	BTL3	Apply	CO5
8.	Explain about the instrument hook up diagram.**(13)**	BTL4	Analyse	CO5
9.	With neat sketches and explain the loop diagram. **(13)**	BTL3	Apply	CO5
10.	**(i)** List some Measurement and Control Devices and/or Function Symbols. **(7)**	BTL4	Analyse	CO5
	(ii) List some Discrete Devices and/or Function Symbols. **(6)**			
11.	**(i)** List Some examples of instrument tag letters .**(7)**	BTL4	Analyse	CO5
	(ii) Draw the example diagram for P&ID. **(6)**			
12.	**(i)** Explain about the logic diagram.**(7)**	BTL4	Analyse	CO5
	(ii) Discuss about the Location Plans for Instruments **(6)**			
13.	With neat sketches and explain the functional diagram.**(13)**	BTL2	Understand	CO5
14.	Describe the Functional Diagrams for the Flow of Information within a Control System. **(13)**	BTL3	Apply	CO5
15.	Draw some of the many instrument symbols found in different types of technical diagrams used to document instrument systems. **(13)**	BTL3	Apply	CO5
16.	Describe about the Instrument Identification Tags. **(13)**	BTL3	Apply	CO5
17.	Draw the block diagram for typical process and explain. **(13)**	BTL3	Apply	CO5

PART-C				
1.	Create instrument location layout with basic requirement with neat sketches.	BTL6	Create	CO5
2.	Describe the necessity of cable routing diagrams with suitable example.	BTL5	Evaluate	CO5
3.	Demonstrate with necessary inputs required for preparing the rack room layout diagram and it necessity.	BTL6	Create	CO5
4.	Draw the schematic diagram for any vendors documents.	BTL6	Create	CO5
5.	Describe about the Identification for Instruments: - Mechanical Equipment, Electrical Equipment, Instruments and Automation Systems .	BTL5	Evaluate	CO5