

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING

QUESTION BANK



VI SEMESTER

1907803 - INSTRUMENTATION IN PETROCHEMICAL INDUSTRIES

Regulation – 2019

Academic Year 2024 – 25

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UNIT I - OIL EXTRACTION AND PROCESSING

Techniques used for oil discovery - seismic survey - methods of oil extraction - oil rig system – Primary and Secondary recovery - Enhanced oil recovery - separation of gas and water from oil – control loops in oil gas separator - scrubber - coalesce

PART – A

Q.No	Questions	BT	CO	Competenc
1.	What is absorption?	BTL 1	CO1	Remember
2.	What is adsorption?	BTL 1	CO1	Remember
3.	What is filtration?	BTL 1	CO1	Remember
4.	What is crystallization?	BTL 1	CO1	Remember
5.	Identify the chemical process involves endothermic reactions.	BTL 1	CO1	Remember
6.	Identify the chemical process involves Exothermic reactions.	BTL 1	CO1	Remember
7.	Define precipitation.	BTL 2	CO1	Understand
8.	Differentiate Endothermic and Exothermic reactions?	BTL 2	CO1	Understand
9.	Give the steps involved in oil-gas separation?	BTL 2	CO1	Understand
10.	Name the different petroleum exploration sites in Tamilnadu.	BTL 2	CO1	Understand
11.	What is meant by petrochemical?	BTL 2	CO1	Understand
12.	Name the principle raw material used in petrochemical industry?	BTL 2	CO1	Understand
13.	List unit operations extensively used in the separative section?	BTL 2	CO1	Understand
14.	Mention the instruments used in refining of crude oil.	BTL 2	CO1	Understand
15.	List the steps involved in processing wet gases?	BTL 2	CO1	Understand
16.	Why is petrochemical preferred over other organic chemical?	BTL 2	CO1	Understand
17.	List the various recovery techniques in petroleum processing.	BTL 1	CO1	Remember
18.	What is the need for petroleum recovery.	BTL 1	CO1	Remember
19.	Draw the P and I diagram of a gas separation process in a petroleum refinery	BTL 2	CO1	Understand
20.	What is OPEC? What is the cause for OPEC?	BTL 1	CO1	Remember
21.	Give the classifications of stratigraphic trap.	BTL 1	CO1	Remember
22.	What is meant by Endothermic reactions?	BTL 1	CO1	Remember
23.	What is meant by Exothermic reactions?	BTL 1	CO1	Remember
24.	Define Unit Operations.	BTL 1	CO1	Remember
PART – B				
1.	Describe in detail how a gas separation process in a petroleum refining is carried out with a aid of a neat P and I diagram. (13)	BTL3	CO1	Remember
2.	(i)Describe in detail the method to discover petroleum mines under sea (13)	BTL3	CO1	Remember

3.	(i)What is the need for separation of oil and gases from crude oil? (5) (ii)With the neat block diagram describe the separation process.(8)	BTL3	CO1	Remember
4.	Examine the various process involved in wet gases with necessary diagram. (13)	BTL3	CO1	Remember
5.	Describe the various EOR techniques for the optimum recovery of oil.(13)	BTL2	CO1	Understand
6.	Discuss in detail the procedure involved in refining crude oil. (13)	BTL2	CO1	Understand
7.	Give the P and I diagram of a gas separation process in petroleum refineries and explain in detail. (13)	BTL2	CO1	Understand
8.	(i)Demonstrate how the distillation used in petroleum industry.(5) (ii)Show the various techniques used to discover the petroleum resources. Explain the seismic mass type in detail. (8)	BTL3	CO1	Apply
9.	Illustrate in detail the seismic method used to discover petroleum mines. (13)	BTL3	CO1	Apply
10.	(i)Analyze the various methods used in primary and secondary recovery in petroleum plants.(7) (ii)Explain the measurements done in those recovery processes.(6)	BTL 4	CO1	Analyze
11.	(i)Explain the various enhanced oil recovery techniques in petroleum plant.(7) (ii) Explain the various methods of oil extraction in petroleum plant.(6)	BTL4	CO1	Analyze
12.	(i)Point out the need for Coalescer in oil and refineries and explain the technology behind Coalescer. (10) (ii)Differentiate the scrubber and separator.(3)	BTL4	CO1	Analyze
13.	List the percentage of output and use of the different products obtained from refining crude oil. (13)	BTL3	CO1	Evaluate
14.	Explain the design and working of Scrubber with neat diagram.(13)	BTL 4	CO1	Analyze
15.	Describe the various control loops in oil gas separator with necessary diagram.(13)	BTL 4	CO1	Analyze
16.	Explain the different products that are obtained from the refining crude oil.(13)	BTL 4	CO1	Analyze
17.	Draw the illustrative diagram of petroleum mine and explain how petroleum is lifted from the deposits in the mine?(13)	BTL 4	CO1	Analyze
PART – C				
1.	Explain the process of extraction of oil from marine environment.(15)	BTL5	CO1	Evaluate
2.	Design the various control loops involved in the separation of gas and water from crude oil. (15)	BTL6	CO1	Create

3.	Compose the need for Scrubber with respect to pollution control in petrochemical industries.(15)	BTL6	CO1	Create
4.	Explain the methods that are used to discover petroleum mines (15)	BTL5	CO1	Evaluate
5.	Compose the need for oil ring system in petrochemical industries (15)	BTL5	CO1	Evaluate

UNIT II PETROLEUM REFINING

Petroleum refining process - unit operations in refinery - thermal cracking - catalytic cracking - Catalytic reforming - polymerization - isomerization - alkylation - Production of ethylene, acetylene and propylene from petroleum.

PART – A

Q.No	Questions	BT	CO	Competenc
1	Define cracking.	BTL 1	CO2	Remember
2	Define: Refining Capacity.	BTL 1	CO2	Remember
3	Define catalytic cracking.	BTL 1	CO2	Remember
4	Define catalytic reforming.	BTL 1	CO2	Remember
5	What are free radicals?	BTL 1	CO2	Remember
6	What are the three stages of oil refining?	BTL 1	CO2	Remember
7	Define polymerization.	BTL 2	CO2	Understand
8	What do you mean by Isomerisation?	BTL 2	CO2	Understand
9	What is Alkylation in a petroleum industry?	BTL 2	CO2	Understand
10	Distinguish between catalytic cracking and catalytic reforming.	BTL 2	CO2	Understand
11	How acetylene is produced from petroleum?	BTL 2	CO2	Understand
12	Name the feed stocks of secondary conversion processes.	BTL 2	CO2	Understand
13	What is the temperature and pressure for cracking?	BTL 2	CO2	Understand
14	How are industrial thermal cracking operations classified?	BTL 2	CO2	Understand
15	Why does the product of cracking have higher molecular weight than the feed itself?	BTL 2	CO2	Understand

16	Why alkenes are not used as fuel?	BTL 2	CO2	Understand
17	Summarize the process of production of ethylene.	BTL 2	CO2	Understand
18	Give example for catalytic reforming.	BTL 1	CO2	Remember
19	Define the process of production of propylene from petroleum.	BTL 1	CO2	Remember
20	What is thermal cracking?	BTL 1	CO2	Remember
21	Give example for polymerization.	BTL 1	CO2	Remember
22	What is meant by catalytic cracking ?	BTL 1	CO2	Remember
23	What is meant by catalytic reforming?	BTL 1	CO2	Remember
24	Draw the process flow of production of ethylene from petroleum.	BTL 1	CO2	Remember
PART – B				
1.	Explain the various low molecular weight products produced after cracking. (13)	BTL 4	CO2	Analyze
2.	Define unit operation and discuss about any two unit operation in refinery of your choice. (13)	BTL 3	CO2	Apply
3.	Write a detail technical note on polymerization techniques in petroleum industries with examples. (13)	BTL 3	CO2	Apply
4.	Discuss in detail the preparation of ethylene from liquid hydrocarbon. (13)	BTL 3	CO2	Apply
5.	(i)Describe in detail with a neat sketch about thermal cracking. (6) (ii)Describe in detail with a neat sketch about catalytic reforming.(7)	BTL 3	CO2	Apply
6.	Discuss the thermal decomposition process of the long chain oil molecules into shorter chains with neat flow diagram.(13)	BTL 3	CO2	Apply
7.	Discuss about alkylation in petroleum industry. (13)	BTL 3	CO2	Apply
8.	Illustrate the procedure followed in the production of ethylene.(13)	BTL 3	CO2	Apply
9.	Demonstrate the experimental procedure followed in the production of acetylene.(13)	BTL 3	CO2	Apply
10.	(i) Differentiate thermal and catalytic cracking. (5) (ii) Explain about catalytic reforming process. (8)	BTL 4	CO2	Analyze
11.	(i)Explain the steps involved in polymerization.(8) (ii)List and explain the products obtained by polymerization.(5)	BTL 4	CO2	Analyze
12.	List the products produced after cracking and also explain its use. (13)	BTL 4	CO2	Analyze
13.	Compare the Isomerization and Alkylation and explain both with relevant diagram.(13)	BTL 4	CO2	Analyze

14.	Integrate the procedure followed in the production of propylene, ethylene and acetylene.(13)	BTL 4	CO2	Analyze
15.	Describe the fluidized bed catalytic cracking method with a neat sketch.(13)	BTL 3	CO2	Apply
16.	With the help of P and I diagram describe how acetylene is separated from petroleum. (13)	BTL 3	CO2	Apply
17.	Compare the ethylene and acetylene and explain both with relevant diagram.(13).	BTL 4	CO2	Analyze
PART – C				
1.	Formulate the common process associated with propylene, ethylene and acetylene.(15)	BTL 6	CO1	Create
2.	Design the P and I diagram for production of ethylene from petroleum.(15)	BTL 6	CO2	Create
3.	Explain the relevant diagrams for process control system with propylene production plant. (15)	BTL 5	CO2	Evaluate
4.	Explain the petroleum refining process followed with respect to the quality of the crude oil.(15)	BTL 5	CO2	Evaluate
5.	Discuss the salient features of catalytic reforming process with neat flow sheet.(15)	BTL 5	CO2	Evaluate

UNIT III - CHEMICALS FROM PETROLEUM				
Chemicals from methane, acetylene, ethylene and propylene - production routes of important Petrochemicals such as polyethylene, polypropylene, ethylene dioxide, methanol, xylene, benzene, toluene, styrene, VCM and PVC.				
PART – A				
Q.No	Questions	BT	CO	Competenc
1	List the chemicals products derived from propylene.	BTL 1	CO3	Remember
2	Write the uses of products derived from propylene.	BTL 1	CO3	Remember
3	List all the second generation petrochemicals.	BTL 1	CO3	Remember
4	What is PVC?	BTL 1	CO3	Remember
5	State the properties of PVC.	BTL 1	CO3	Remember
6	State the properties of VCM.	BTL 1	CO3	Remember

7	Write the polymers obtained from petrochemicals.	BTL 2	CO3	Understand
8	Give the products obtained from methane.	BTL 2	CO3	Understand
9	Give any one application of acetylene derivatives.	BTL 2	CO3	Understand
10	Discuss diesel index.	BTL 2	CO3	Understand
11	Write the formula for benzene.	BTL 2	CO3	Understand
12	Write the formula for toluene.	BTL 2	CO3	Understand
13	Give the structure of polyvinyl chloride.	BTL 2	CO3	Understand
14	Mention the effects of vinyl chloride.	BTL 2	CO3	Understand
15	Classify the different products derived from propylene.	BTL 2	CO3	Understand
16	Mention the various chemicals from petroleum.	BTL 2	CO3	Understand
17	Write the composition of Xylene.	BTL 2	CO3	Understand
18	What is the production route for ethylene dioxide.	BTL 1	CO3	Remember
19	Draw the production route polyethylene.	BTL 2	CO3	Understand
20	Draw the production route for VCM.	BTL 2	CO3	Understand
21	Draw the production route for polypropylene.	BTL 2	CO3	Understand
22	How do you separate benzene from aromatics complex?	BTL 2	CO3	Understand
23	How do you separate toluene from aromatics complex?	BTL 2	CO3	Understand
24	How do you separate xylene from aromatics complex?	BTL 2	CO3	Understand
PART – B				
1.	Explain the various chemicals from methane and Explain.(13)	BTL 4	CO3	Analyze
2.	(i) Describe the chemicals obtained from ethylene.(8) (ii) List the applications of ethylene derivatives.(5)	BTL 3	CO3	Apply
3.	(i) Write down the physical and chemical properties of Propylene. (10) (ii)What are the different methane derivatives.(3)	BTL 3	CO3	Apply
4.	What are the various operating variables involved in a reactor for the production of Ethylene. (13)	BTL 3	CO3	Apply
5.	Describe the derivatives from propylene and explain its procedure.(13)	BTL 3	CO3	Apply
6.	Discuss the manufacture of LDPE and HDPE with neat flow diagram.(13)	BTL 3	CO3	Apply

7.	Describe the process of methanol production using ICI process with neat flow diagram.(13)	BTL 3	CO3	Apply
8.	(i) Illustrate the steps involved in the production of polyethylene.(7) (ii) Explain with necessary P & I diagrams for the production of polyethylene.(6)	BTL 3	CO3	Apply
9.	(i) Show the other chemical names for Styrene.(3) (ii) List the various manufacturing procedures and explain any one	BTL 3	CO3	Apply
10.	(i) Explain the acetylene derivatives with application. (7) (ii) Explain about emulsion polymerization.(6)	BTL 4	CO3	Analyze
11.	(i) Analyze the various production rules involved in producing polypropylene.(7) (ii) Explain any one route with the instrumentation systems required.(6)	BTL 4	CO3	Analyze
12.	(i) Classify the production procedures involved in VCM and PVC and explain the best route.(13)	BTL 4	CO3	Analyze
13.	Recommend the best production route available for the production of Benzene and Toluene. Also Justify your recommendation.(13)	BTL 4	CO3	Analyze
14.	Formulate the procedure involved in the production of Xylene with necessary P & I diagrams.(13)	BTL 4	CO3	Analyze
15.	Explain the production and process control system for Ammonia Andrus process.(13)	BTL 4	CO3	Analyze
16.	Explain in detail about suspension polymerization. (13)	BTL 4	CO3	Analyze
17.	Compare the production procedures involved in VCM and PVC and state the difference between VCM and PVC. (13)	BTL 4	CO3	Analyze

PART – C

1.	Explain any one method of your choice with the required controls can be used to design instrumentation systems. (15)	BTL 6	CO3	Create
2.	Evaluate the various process involved in the manufacturing process of methanol. Also mention the application of methanol.(15)	BTL 5	CO3	Evaluate
3.	Explain how the viscosity is measured in a petroleum industry.(15)	BTL 5	CO3	Evaluate
4.	Design the various production routes available for producing ethylene dioxide.(15)	BTL 6	CO3	Create
5.	Explain the production of Vinyl Chloride Monomer with the help of P&I diagram .	BTL 5	CO3	Evaluate

UNIT IV- CONTROL LOOPS IN PETROCHEMICAL INDUSTRY				
Control of binary and fractional distillation columns - Control of catalytic and thermal crackers – control of catalytic reformer - control of alkylation process - Control of polyethylene production – Control of VCM and PVC production.				
PART – A				
Q.No	Questions	BT	CO	Competenc
1	List the parameters to be measured in the refinery process.	BTL 1	CO4	Remember
2	Enlist the selection procedure for choosing the instrument for petroleum industry.	BTL 1	CO4	Remember
3	What is the advantage of automatic control in an industry?	BTL 1	CO4	Remember
4	What are the products of fractional distillation of petroleum?	BTL 1	CO4	Remember
5	What are the control measures of thermal crackers?	BTL 1	CO4	Remember
6	What is PVC, VCM?	BTL 1	CO4	Remember
7	What is the need for composition controller in a petrochemical industry?	BTL 2	CO4	Understand
8	Discuss the control actions performed in catalytic cracking.	BTL 2	CO4	Understand
9	Discuss the control parameters used for thermal cracking.	BTL 2	CO4	Understand
10	Brief about the control of thermal crackers and its process variables.	BTL 2	CO4	Understand
11	Show the expression relating internal and external reflux ratio of a distillation column in a petrochemical industry.	BTL 2	CO4	Understand
12	Discuss the control actions performed in alkylation process.	BTL 2	CO4	Understand
13	Explain the automatic controls in the production polyethylene.	BTL 2	CO4	Understand
14	State about enriching section in a distillation column.	BTL 2	CO4	Understand
15	Explain the function of gauge glass in a petroleum tank.	BTL 2	CO4	Understand
16	Analyze the control actions performed in VCM production.	BTL 2	CO4	Understand
17	Enumerate the controls used in petrochemical industry.	BTL 2	CO4	Understand
18	Compare cracking and reforming.	BTL 2	CO4	Understand
19	Develop the block diagram of a distillation column control.	BTL 2	CO4	Understand
20	Design the process control instrumentation diagram for alkylation process.	BTL 2	CO4	Understand
21	What is meant by reflux control?	BTL 1	CO4	Remember

22	List the controls involved in polyethylene production.	BTL 1	CO4	Remember
23	List the controls involved in fractional distillation columns.	BTL 1	CO4	Remember
24	List the controls involved in catalytic reformer.	BTL 1	CO3	Remember
PART – B				
1.	(i)How boiler is feed rate measured in a refinery?(3) (ii)Name the various flow measuring instruments in a petroleum industry.(10)	BTL 4	CO4	Analyze
2.	(i)How steam is feed rate measured in a refinery?(3) (ii)Name the various level measuring instruments in a petroleum industry.(10)	BTL 4	CO4	Analyze
3.	(i)Write a detailed note on the selection and maintenance of measuring instruments in petrochemical industry. (7) (ii)With the help of neat sketches describe the lead compensation in temperature sensor placed in a process environment.(6)	BTL 3	CO4	Apply
4.	Describe the common methods of density measurement in Petroleum evaporator station with the aid of neat sketch.(13)	BTL 3	CO4	Apply
5.	(i)Discuss the procedure involved in controlling the quality of the quality of the products in a distillation column.(7) (ii)Write a detailed note on the control and instrumentations involved in catalytic cracking.(6)	BTL 3	CO4	Apply
6.	(i)Discuss the procedure involved in controlling the top product of distillation column.(13)	BTL 3	CO4	Apply
7.	(i)Distinguish the procedures involved in controlling the bottom product and top product of distillation column.(7) (ii)Write short notes on the control involved in the production of poly vinyl chloride.(6)	BTL 3	CO4	Apply
8.	Examine the advanced control strategies followed in control of binary and fractional distillation column and also explain how the efficiency is improved. (13)	BTL 3	CO4	Apply
9.	(i)Illustrate the Basic controls involved in Binary distillation column. (6) (ii)Explain the difference between binary and fractional distillation.(7)	BTL 3	CO4	Apply
10.	Analyze the instrumentation equipments selection procedures involved in petrochemical industries and also explain in what way it differs from	BTL 4	CO4	Analyze
11.	Explain the control system used in the distillation column and mention the components used in it with neat diagram. (13)	BTL 4	CO4	Analyze
12.	(i)Explain the basic principle behind the stripping and enriching sections of distillation column. (8)	BTL 4	CO4	Analyze

13.	Evaluate the control of alkylation process and also explain the control procedure involved in that process.(13)	BTL 4	CO4	Analyze
14.	List the control and instrumentation equipments involved in the control of VCM production and Draw the process flow diagram.(13)	BTL 4	CO4	Analyze
15.	List the control and instrumentation equipments involved in the control of PVC production and Draw the process flow diagram.(13)	BTL 3	CO4	Apply
16.	Explain the various products obtained using distillation using the volatility. (13)	BTL 3	CO4	Apply
17.	Give the principle and operation of automatic control of polyethylene production. (13)	BTL 3	CO4	Apply
PART – C				
1.	With neat sketches explain how the alkylation processes are controlled effectively.(15)	BTL 6	CO4	Create
2.	Evaluate in detail the various Alarms and Annunciators circuits used in refinery. (15)	BTL 5	CO4	Evaluate
3.	Explain with neat sketches the installation of sensors in reactor distillation column.(15)	BTL 5	CO4	Evaluate
4.	How do you successfully perform distillation control in catalytic reformers?(15)	BTL 6	CO4	Create
5.	With the help of neat sketches or P&ID explain the lead compensation in temperature sensor placed in a process environment.	BTL 5	CO4	Evaluate

UNIT V - SAFETY IN INSTRUMENTATION SYSTEMS				
Area and material classification as per National Electric Code (NEC) - Classification as per International Electro technical Commission (IEC) - Techniques used to reduce explosion hazards -Pressurization techniques - Type X, Type Y and Type Z - Intrinsic safety - Mechanical and Electrical isolation - Lower and Upper explosion limit				
PART – A				
Q.No	Questions	BT	CO	Competenc
1	What is an explosion?	BTL 1	CO5	Remember
2	What is the main purpose of National Electrical Code?	BTL 1	CO5	Remember
3	IEC stands for what?	BTL 1	CO5	Remember
4	What is meant by LEL?	BTL 1	CO5	Remember
5	Define flash point.	BTL 1	CO5	Remember

6	State the maximum allowable lower explosive level LEL.	BTL 1	CO5	Remember
7	What is HPLC? Write the significance of the instrument.	BTL 1	CO5	Remember
8	How area classification is done as per NEC?	BTL 2	CO5	Understand
9	How material classification procedure is done as per NEC standard?	BTL 2	CO5	Understand
10	What is classification procedure as per NEC standard?	BTL 1	CO5	Remember
11	How hazardous areas are categorized ?	BTL 2	CO5	Understand
12	What is meant by sources and grades of release.	BTL 1	CO5	Remember
13	Show the important techniques used to reduce explosion hazard.	BTL 2	CO5	Understand
14	Point out the material classification as per IEC standard.	BTL 2	CO5	Understand
15	How hazardous areas are classified?	BTL 2	CO5	Understand
16	Differentiate surface temperature and self-ignition temperature.	BTL 2	CO5	Understand
17	What do you mean by Intrinsic safety?	BTL 2	CO5	Understand
18	What is meant by purged systems with the reducing division levels for Type X, Type Y and Type Z.	BTL 1	CO5	Remember
19	List the advantages of the safety codes.	BTL 2	CO5	Understand
20	Draw the fire triangle.	BTL 2	CO5	Understand
21	What is meant by UEL ?	BTL 1	CO5	Remember
22	Define the need for fire triangle.	BTL 1	CO5	Remember
23	What is meant by intrinsic safety?	BTL 1	CO5	Remember
24	What is mechanical and electrical isolation?	BTL 1	CO5	Remember
PART – B				
1.	Describe some of the safety instruments used in the petrochemical industry and mention its applications. (13)	BTL 3	CO5	Apply
2.	(i)Describe the area classification as per National Electric Code - NEC.(7) (ii)List how material classification is done as per National Electric Code -NEC (6)	BTL 3	CO5	Apply
3.	Tabulate the material classification in Hazardous area as per Electro technical commission.(13)	BTL 3	CO5	Apply
4.	(i)What is meant by pressurization technique? (3) (ii)In what way it is used in the reduction of explosion hazards in	BTL 3	CO5	Apply

5.	(i)Differentiate Type X, Type Y and Type Z in the safety of petrochemical industries.(7) (ii)Explain all of the above with necessary diagrams.(6)	BTL 3	CO5	Apply
6.	What are the various techniques to be followed by petrochemical units to reduce explosion hazards?(13)	BTL 3	CO5	Apply
7.	Write notes on: (i)Pressurization techniques.(6) (ii) Mechanical and electrical isolation.(7)	BTL 3	CO5	Apply
8.	(i)Demonstrate the methods followed in mechanical isolation petrochemical industries.(7) (ii)List the standard isolation techniques followed in such an industry with relevant representations.(6)	BTL 4	CO5	Apply
9.	Illustrate the various protection techniques employed in minimizing the potential risks of explosion or fire from electrical located in hazardous locations.(13)	BTL 4	CO5	Apply
10.	Compare the intrinsic safety, explosion proof and pressurization techniques in the different intrinsic zones based on safety, cost, maintenance and flexibility. (13)	BTL 4	CO5	Analyze
11.	Analyze the need for Electrical isolation in petrochemical industries.(13)	BTL 4	CO5	Analyze
12.	Compare the extrinsic safety, explosion proof and pressurization techniques in the different extrinsic zones based on safety, cost, maintenance and flexibility. (13)	BTL 4	CO5	Analyze
13.	Explain the general safety precautions to be followed in petroleum industry.(13)	BTL 4	CO5	Analyze
14.	(i)Explain design regulations for explosion proof electrical equipment.(5) (ii) List the sources of ignition and explain with example. (8)	BTL 4	CO5	Analyze
15.	Describe the material classification in petrochemical industries as per Electro technical commission.(13)	BTL 3	CO5	Apply
16.	Explain how material classification is done as per National Electric Code -NEC.(13)	BTL 4	CO5	Analyze
17.	Explain in detail about Lower and Upper explosion limit.	BTL 4	CO5	Analyze
PART – C				
1.	Differentiate the intrinsic safe zone 1 and zone 2. Explain the ignition triangle. When is equipment said to be intrinsically safe? (15)	BTL 6	CO5	Create
2.	Explain the mechanical isolation levels as per the NEC standards.(15)	BTL 6	CO5	Create

3.	Evaluate about lower and upper explosion limit followed in petrochemical industries.(15)	BTL 5	CO5	Evaluate
4.	Evaluate how to reduce explosion hazards in petrochemical industries with necessary diagrams.(15)	BTL 5	CO5	Evaluate
5.	Evaluate the different safety codes along with their organisation.	BTL 5	CO5	Evaluate