

Dr. Babasaheb Ambedkar Technological University, Lonere

Department of Petrochemical Engineering

Subject: Plant Utility and Process Safety

Subject Code: BTCHC 605

Class: Third Year

Semester: Sixth

Question Bank

| <u>Unit No 01</u> | | |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Qu. No. | Questions | Marks |
| 1 | Define plant utility. Write the various utilities in process plant industries in details. | 6 |
| 2 | Write a short notes on a) Water storage and distribution for fire fighting b) Compressed air as plant utility c) Venting and flaring d) Impurities in water | Each 4 |
| 3 | Define hard water and soft water. | 2 |
| 4 | Explain priming and foaming. | 4 |
| 5 | Name the various water softening process. Explain ion exchange process with neat sketch. | 8 |
| 6 | Give the comparison of zeolite process and ion exchange process of water. | 4 |
| 7 | Describe the lime soda process with neat sketch. a) Cold lime soda process b) Hot lime soda process. | Each 6 |
| 8 | Explain zeolite process with neat sketch. | 6 |
| 9 | Describe the demineralization process with neat diagram. | 8 |
| 10 | Write notes on a) Compressed air b) fan air c) Blower air | Each 4 |
| 11 | Write a note on instrument air. | 6 |
| 12 | Gives the different uses of compressed air in a process industry. | 4 |
| 13 | Define: a) Caustic embrittlement b) Priming and foaming c) Scale and Sludge | Each 2 |
| 14 | Write down the difference between temporary and permanent hardness. | 4 |
| 15 | List advantages of hot lime soda over cold lime soda. | 4 |
| 16 | What are the disadvantages of scale and sludge formation in boilers? | 6 |

| | | |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------|
| 17 | Define: a) Sedimentation b) Coagulation c) Filtration d) Sterilization | Each 2 |
| 18 | Write a note on a) Cation exchange resin b) Anion exchange resin | 4 |
| 19 | Write down the difference between scale and sludge. | 4 |
| 20 | Define plant utility and write down the importance of plant utility. | 6 |
| 21 | Explain water storage and distribution for firefighting. Explain pollution abating by flare and vents. | 6 |
| <u>Unit No 02</u> | | |
| 1 | Explain in detail the fire tube boiler with diagram.(any one type). | 6 |
| 2 | Explain in detail the water tube boiler with diagram.(any one type). | 6 |
| 3 | Give the types of fires. Explain briefly four most common types of fire extinguishers. | 6 |
| 4 | Describe the formation of steam at constant pressure with neat diagram. | 6 |
| 5 | Describe in details Indian Boiler Act,1923. | 12 |
| 6 | Describe simple vertical boiler with neat diagram. | 6 |
| 7 | What is steam generator? Write the function and examples of each. a) Boiler Accessories b) Boiler Mountings | 6 |
| 8 | Write down the examples of water tube boiler and fire tube boiler | 6 |
| 9 | Define a) Enthalpy of water. b) Enthalpy of Evaporation | 4 |
| 10 | Gives the reason for scaling in boilers. | 6 |
| 11 | What is dryness fraction? Write down formulae. | 2 |
| 12 | Write down classification of boiler according to various factors. | 6 |
| 13 | Explain working of economizer with neat sketch. | 6 |
| 14 | Write down difference between fire tube boiler and water tube boiler. | 4 |
| 15 | Write down advantages and disadvantages of water tube boilers. | 4 |
| 16 | What are the impurities of water which causes corrosion in boilers? How corrosion can be prevented? | 6 |
| 17 | Draw the neat sketch of super heater and explain its working. | 6 |
| 18 | Draw the neat sketch and label the parts. a) Simple vertical boiler b) Chochran boiler c) Scotch boiler | Each 4 |
| 19 | Describe the construction and working of thermic fluid heater in detail. Write down | 8 |

| | | |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| | industrial application of thermic fluid heater. | |
| 20 | Give any four duties of boiler inspector. | 4 |
| 21 | Gives the properties and uses of a) Dowtherm A b) Dowtherm E c) Mineral oils d) Sillicon compound e) Therminol FR f) Sodium Potassium Alloys | Each 3 |
| 22 | What is steam generator and what is its function? What are uses of steam? | 4 |
| 23 | Classify the boilers according to various factors. | 4 |
| 24 | What are different types of accessories? Give their name and explain any one in detail. | 6 |
| 25 | Give any four factors for boiler selection. | 4 |
| <u>Unit No 03</u> | | |
| 1 | What is refrigeration cycled? Explain vapor absorption system in details. | 6 |
| 2 | Explain the vapor compression refrigeration cycle with neat diagram. | 6 |
| 3 | Define refrigerant and write a note on classification of refrigerants. | 6 |
| 4 | Write note on primary and secondary refrigerants. | 6 |
| 5 | Write down the safe working properties of ideal refrigerants. | 6 |
| 6 | Define Cooling tower. Explain in detail types of cooling tower with neat sketch. | 8 |
| 7 | What is ecofriendly refrigerant? Give one example. | 6 |
| 8 | Write a note on cryogenic refrigerator. | 4 |
| 9 | Define any two. a) Refrigeration b) Antifreeze c) Cooling Tower | Each 2 |
| 10 | Draw the neat sketch of cooling tower. (Any one type). | 4 |
| 11 | Write down the difference between natural draft cooling tower and forced draft cooling tower. | 6 |
| 12 | What is selection criteria for refrigerant.? | 4 |
| 13 | Write a note on cooling tower. | 6 |
| 14 | Define coefficient of performance. A refrigerator is working on reversed Carnot cycle between temperature of 30°C to -10°C with capacity of 10 tones. Find: a) C.O.P. b) Heat Rejected/ hr from the system c) Power required for machine. | 6 |
| 15 | Write a note on Refrigerants: a) Ammonia b) Carbon dioxide c) Refrigerant 500 d) Methylene chloride e) Sulphur dioxide | Each 3 |

| | | |
|-----------|-----------------------------------------------------------------|----------|
| 16 | Write a note on a) Brine b) Antifreeze solution | 6 |
| 17 | Guess the following refrigerants a) R134 b) R22 c) R04 | 3 |

Unit No 04

| | | |
|-----------|----------------------------------------------------------------------------------------------------------------------------------|---------------|
| 1 | Write in short the hazards of following chemicals a) Acrylonitrile b) acetyl chlorides c) anhydrous ammonia d) ethylene oxide | Each 3 |
| 2 | Explain safety in handling Chlorine, chlorine hazard and chlorine leakage management. | 6 |
| 3 | What are the safety parameters in process design? Explain polyvinyl chloride plant with its safety parameters. | 6 |
| 4 | Write the hazards and remedies of acryl amide and anhydrous ammonia. | 6 |
| 5 | What are the safety parameters in process design? Explain safety parameters in the process design of phenol from cumene. | 8 |
| 6 | Explain safety parameters in the process design of phenol from cumene. | 6 |
| 7 | What is the requirement of safety in chemical plants, give the examples | 6 |
| 8 | Explain safety parameters in the production of aromatic nitriles. | 6 |
| 9 | Write down importance of vessel design. | 6 |
| 10 | Write a short note on a) Butyl Amine b) Acryl amide c) Acetonitrile d) Allyl Alcohol | Each 3 |
| 11 | Write a short note on a) Benzene b) Acetaldehyde c) Acetone d) Toluene e) Acetic acid | Each 3 |
| 12 | Describe the in details classification of chemical process. | 6 |
| 13 | Write down the examples of hazardous processes. | 6 |
| 14 | What are the safety parameters in process design? Explain safety parameters in the production of aromatic nitriles. | 6 |

Unit No 05

| | | |
|----------|---------------------------------------------------------------------------------------------|----------|
| 1 | Short note on safety in handling gases, liquids and solids. | 6 |
| 2 | Explain the safety and design consideration in phenol production process with flow diagram. | 6 |

| | | |
|----|------------------------------------------------------------------------------------------------------|--------|
| 3 | What are LEL and UEL? Explain flammable liquid hazard. | 6 |
| 4 | What is the fire ball? Explain fire ball hazards. | 6 |
| 5 | Define following terms: a) TLV b) TWA c) STEL d) MAC | Each 2 |
| 6 | Describe in details electrical safety in chemical process plant. | 6 |
| 7 | Explain pressure vessel hazards in detail. | 6 |
| 8 | Describe in details the safety provision for pressure vessels. | 6 |
| 9 | Explain chlorine hazards in detail. | 6 |
| 10 | Write down important safety consideration in ammonia storage. | 6 |
| 11 | Write a note on handling of LNG. | 6 |
| 12 | Explain fail safe concept. | 6 |
| 13 | Write down the requirement to be fulfilled for storing hydrocarbon or chemicals. | 6 |
| 14 | Write a note on safety in handling of fluorine. | 4 |
| 15 | Write a note on oil spillage hazard. | 4 |
| 16 | Write a note on flammable liquid hazard. | 4 |
| 17 | Write a note on explosive hazard. | 4 |
| 18 | Write a note on toxic hazard. | 4 |
| 19 | Write down the hazard of metals: a) Arsenic b) Cadmium c) Barium d) Copper e) Mercury | Each 3 |
| 20 | Write down the hazard of metals: a) Selenium b) Tin c) Zincs | Each 3 |

Unit No 06

| | | |
|---|-----------------------------------------------------------------------------------------|---|
| 1 | List out the protective devices. Write the safety checklist points during the shutdown. | 6 |
| 2 | What is safety checklist? Explain safety checklist during startup. | 6 |
| 3 | Define fire and Write the classification of fire with examples. | 6 |
| 4 | Write down the classification of fire extinguishers. | 4 |
| 5 | Describe with neat sketch dry chemical powder fire extinguisher. | 6 |
| 6 | Describe with neat sketch Carbon dioxide fire extinguisher. | 6 |
| 7 | Describe with neat sketch Soda acid fire extinguisher. | 6 |
| 8 | What is safety checklist? Explain safety checklist during shutdown mode.. | 6 |
| 9 | Write down general safety precautions for maintenance of fire extinguishers. | 6 |

| | | |
|-----------|-------------------------------------------------------------------------------------------------------------------|---------------|
| 10 | What is safety checklist? Explain safety checklist for installation. | 6 |
| 11 | What is safety checklist? Explain safety needs during construction. | 6 |
| 12 | Define fire and explain fire triangle with neat sketch. | 4 |
| 13 | Write a note on personal protective equipment. | 6 |
| 14 | Write down application of a) Face shield b) Ear plug c) Apron d) Hand gloves e) Shoes f) Helmet | Each 1 |
| 15 | Explain gaseous agents extinguishing system and automotive sprinkler system. | 6 |
| 16 | Give the types of fires. Explain briefly four most common types of fire extinguishers. | 6 |
| 17 | Explain the foam for firefighting and their characteristics. | 6 |
| 18 | Explain the classes of fire and type of extinguishers used for each type. | 6 |
| 19 | What are the protective devices used in industry for a) Face b) Eyes c) Ears d) Legs e) body | Each 1 |
| 20 | How fires are classified? State their causes. | 6 |