**Pharmaceutical engineering Questions Bank**

**B pharmacy semester-3**

**Unit-1**

**Chapter 1: Flow of fluids**

1. What is the use of a pitot tube? Write its advantages and disadvantages.
2. Explain the term ‘head’. List the different heads in the Bernoulli’s Theorem.
3. What is Reynolds number? Describe its importance.
4. List the advantages and disadvantages of rotameter.
5. How are losses of energy due to enlargement in cross section measured? Give relevant equation and explain the terms..
6. Give Reynolds number and explain the symbols used therein.
7. What is pressure head? How it is calculated?
8. Differentiate constant pressure and constant area meters. Give Examples Of devices under each category.
9. Why is mercury used as a liquid in manometer?
10. Describe the types of flow patterns exhibited by liquids in motion.
11. Write Bernoulli’s equation and explain the symbols used therein with a Labelled diagram.
12. Describe Reynolds experiment to illustrate type of flow.
13. Explain the characteristics of different types of flow. Add a note on Reynolds number.
14. Compare and contrast the advantages and disadvantages of pitot tube And rotameter.
15. What are the merits and demerits of venturi meter over orifice meter?
16. Explain principle and working of simple manometer.
17. Describe relevant equations for calculation of flow rates using orifice Meter.
18. Derive Bernoulli’s equation sating the assumptions.
19. Explain the energy losses that occur when a fluid flows through a pipe With relevant equations.
20. Explain the principle and construction of venturimeter.
21. Explain construction and working of differential monometer.

**Chapter 2 Size reduction**

1. It is essential to include a sieve in the size reduction equipment?
2. In a hammer mill, the particle size of the powders is far less than mesh size of the screen. How is it possible?
3. Why do screen woven sieves give more fine powder than the wire woven sieves?
4. Size reduction of vegetable matter is essential for the extraction of crude drugs. Explain.
5. Why is it difficult to obtain uniform sized product during milling Without the use of sieve?
6. Fluid energy mill is better equipment for size reduction of thermolabile Substances compared to hammer mill. Substantiate.
7. Ball mill is not useful for size reduction of fibrous material. Explain.
8. How is it possible to prevent the heat generated during milling using Colloid mill?
9. Size reduction of a material enhances the action of drugs. Explain. Name one mill each for fibrous material and hard material.
10. Under what condition size reduction is not effective in ball mill?
11. How do you prevent the problems of sticking and clogging of sieves the size reduction equipment?
12. List special precautions to be taken while thermolabile substances are subjected to size reduction process.
13. Why should powder contains fewer amounts of fines when it is meant for percolation process of extraction?
14. What are the advantages of swinging type of hammer compared to rigid Hammers?
15. Powders of same particle size that are obtained by different equipment have same physicochemical characteristics. True or False. Justify.
16. List the areas in which size reduction equipment is used in tablet Production.
17. A large number of size reduction equipment are available currently. Why do we require so many types of mills?
18. Size reduction of powder is not possible, if particle do not contain flaws or cracks. Explain.
19. The classical equipment mortar and pestle uses the mechanism of Impact in size reduction. True or False. Explain.
20. Fluid energy mill is meant for wet grinding. True or False. Explain.
21. Reducing the size of the particles to fines leads to particle aggregation. True or False. Explain.
22. Size reduction mill can also be used as mixing or dispersion equipment. True or False. Explain.
23. How does sickness affect the process of size reduction?
24. How does the presence of moisture interfere with the process of size reduction?
25. Differentiate the mechanisms’ attrition’ and ‘impact’ in For size reduction.
26. Differentiate dry grinding and wet grinding. State Rittinger’s law.
27. Describe five factor that influence the selection of milling equipment for size reduction.
28. Explain with the help of a diagram the construction and working of a Ball mill.
29. Explain with the help of diagram the construction and working of a Hammer mill..
30. Describe the mechanism of size reduction with suitable examples of Equipment.
31. What is ultra-fine grinder? Explain the concept of ultra- fine grinding.
32. Describe ‘micronizer’. Describe aseptic grinding process of antibiotics.
33. List the laws governing size reduction. What is work index?
34. How is size reduction affected in ultra-fine grinders? Describe the Mechanism.
35. How is energy utilized in size reduction accounted for?
36. Explain the factors related to feed-materials influencing size reduction.
37. Describe the construction, working, advantages and disadvantages of Ultra-fine grinder.
38. Describe the milling equipment with the help of a neat diagram that uses The principle of shear and impact.
39. Explain the theories related to the size reduction of a powder.
40. Explain the advantages and disadvantages of size reduction process.
41. State and explain the laws governing size reduction.
42. Describe the mechanism and modes of size reduction of solid drugs.

**Chapter 3 Size separation**

1. Name the standards of screens used in pharmaceutical practice.
2. What are standard sieves?
3. Differentiate ideal and actual screens.
4. Enumerate different modes of size separation.
5. List the specifications and standards for sieves
6. Explain the term blinding of screen. How is it prevented?
7. What are various grades of course powders? Define them.
8. Give the classification of fine powders with definitions.
9. What are advantages of expressing sieves by a sieve number over Nominal size of aperture?
10. Differentiate the terminology, normal size of aperture and nominal Diameter of the wire.
11. What are the uses of screen analysis? How is it expressed?
12. List the methods of sieve analysis used for testing the powders. Give their relative advantages.
13. Enlist various grades of powders official in pharmacopoeia.
14. What is the difference between sedimentation and elutriation?
15. What is the difference between free setting and hindered setting?
16. State the term ‘elutriation’. Explain its applications and advantages.
17. What is the difference between static and moving liquid methods Elutriation?
18. Compare the methods of sieving and classification in terms of their Utility.
19. Define sieve number and nominal aperture size.
20. Explain the working of a cyclone separator and its usefulness.
21. Describe the method of size separation using Sieve shaker.
22. Explain various grades of powders official in pharmacopoeia.
23. Give the details about the various standards fixed by the pharmacopoeia For sieves.
24. Describe the specifications of standard sieves as per IP.
25. Explain the concept of settling behaviour using water with a suitable Diagram.
26. Explain the behaviour of slurry setting of thickeners with a suitable Diagram.
27. Define the term ‘Elutriation’. Write its applications.
28. Explain the mechanism and applications of Elutriation tank
29. Explain the methods Of size separation of particles in a powder using air as a medium
30. Explain the principles of sedimentation of particles using liquid as a Medium.
31. Explain the specific uses and applications of a scrubber. Draw the Sketch of the equipment.
32. Explain construction and working of bag filter.
33. Explain principle and working of cyclone separator.
34. Describe one industrial method for size separation of a powder and its applications.

**Chapter 4 Mixing**

1. Mention the equipment used for solid-solid mixing.
2. List the equipment used for powder mixing in pharmaceutical industry.
3. Explain the working of a mixer used for mixing dry powders before Granulation.
4. Explain the construction and working of a ribbon blender for mixing Solids.
5. Write the uses of the sigma blade blender.
6. Explain the factors influencing mixing of solids. Write the principle of planteraty mixer
7. Describe the equipment for solid-solid mixing of pharmaceutical Materials.
8. Define and differentiate mixing and agitation.
9. Classify liquids based on their miscibility. Give one example in each Case.
10. Enumerate the applications of liquid mixing.
11. Describe the mechanisms of liquid mixing.
12. Enumerate the mechanisms of solids mixing.
13. Explain flow patterns of impellers.
14. What are the factors affecting selection of a mixer?
15. How are pipe mixers advantageous in liquid mixing?
16. What is meant by vortex? How is it prevented?
17. Give the characteristics of mixing impellers.
18. Describe the operation of agitator mixers.
19. Describe the turbine mixer with flow pattern.
20. Suggest a suitable mixer and its operation for mixing of viscous liquids.
21. Draw a neat labelled diagram of mixing tank with accessories for efficient liquid mixing.
22. Describe the principle, working, and advantages of jet mixer.
23. What are flow components for liquids? Explain their role during mixing.
24. Explain the factors influencing mixing of solids.
25. What are the reasons for vortex? What are the drawbacks of vortex? Suggest solutions for the problems of vortex formation.
26. Discuss the devices used for liquid-liquid mixing.
27. Suggest suitable mixing equipment for semisolids.
28. List different factors influencing the selection of an emulsifier.
29. The principle, construction, working, advantages, and Disadvantages of a Silverson emulsifier with the help of a neat diagram.
30. Describe the construction and working of the rapisonic homogenizer.
31. Write the principle of a mixer suitable for mixing of solids and Semisolids.
32. With the neat sketch, describe the construction and working of equipment for mixing pastes and plastic masses. What are their pharmaceutical applications?

**Unit-2**

**Chapter 2 Evaporation**

1. Explain the term Evaporator capacity.
2. Define evaporation in terms of capacity and economy as applied to Evaporation practice.
3. What is calandria? Give its uses.
4. What is calandria? Write its importance.
5. What are the different modes of feed in multiple effect evaporator?
6. What are the criteria in selecting the metals for the construction of steam Jacketed kettle?
7. Write the importance of forced circulation in forced circulation Evaporator.
8. How is multiple effect evaporator advantageous over single effect Evaporator?
9. Elaborate the concept of multiple effect evaporation. What specific advantages does it offer?
10. Explain the construction and working of climbing film evaporator.
11. Describe the construction and working of film evaporator of any one type.
12. Explain the construction and working of a forced circulation evaporator.
13. Explain the construction and working of a horizontal tube evaporator.
14. How does film evaporator function? Elaborate the answer with a neat Sketch of one such evaporator. List the merits, and demerits of film evaporator system.
15. Classify evaporators. Describe principle, construction and working of a Climbing film evaporator.
16. Explain the term ‘multiple effect evaporation’ and ‘evaporator Capacity. How can many effects go into a multiple effect evaporator?
17. What do you understand by multiple effect evaporator’? Describe one, Such evaporator. How do you feed such evaporator?
18. Classify evaporators. Describe principle and working of multiple effect Evaporator.

**Chapter 3 Heat transfer**

1. Describe the types of condensation for saturated vapour free from non condensable gases.
2. Define Black body and Grey body.
3. Give characteristics of drop wise and film types condensation.
4. Drop wise or film type condensation gives superior value of Overall heat Transfer co-efficient and why?
5. List the characteristics of heat transfer by radiation.
6. What are ‘Grey bodies’? How do they radiate heat?
7. Give the final equation for heat transfer by conduction through Resistances in series and explain the terms.
8. What are overall heat transfer co-efficient and individual film Coefficient?
9. Differentiate between film coefficient and overall heat transfer Coefficient.
10. What is surface coefficient? Write its importance.
11. What are overall heat transfer coefficient’ and individual heat transfer coefficients?
12. Define conductivity with a suitable example.
13. State and explain Stefan Boltzmann’s law of heat of radiation.
14. State and explain Fourier’s law of heat transmission with equation.
15. Explain “Nucleate boiling’ and ‘Film boiling’.
16. Define radiation. Explain Stefan Boltzmann’s Law.
17. Write the final equation for heat transfer by conduction through resistance in parallel and explain the terms.
18. Differentiate Log mean radius and arithmetic Mean radius in conduction of heat. What are its applications?
19. What is mean by overall heat transfer coefficient? What is its significance.
20. Differentiate heat interchanger and heat exchanger.
21. Write the differences between steam trap and drainage pipe in handling steam effectively.
22. Describe the term ‘entrainment’. How is it prevented?
23. Describe the possible reasons for foaming.
24. Describe the advantages and disadvantages of steam boiler.
25. List for characteristics of steam.
26. List the advantages and disadvantages of two each of super heated Steam.
27. Explain the terms ‘dry saturated steam’ and ‘superheated steam’.
28. Explain the role of stagnant film in the flow of heat in liquids.
29. Define ‘overall heat transfer coefficient’ and ‘individual film Coefficient.
30. Write Stefan Boltzman equation. Explain the terms.
31. Compare and contrast heat transmission following counter current and parallel current feed techniques with relevant équations.
32. Derive Fourier’s law for the conduction of heat through a metal wall. Mention its applications.
33. Derive an equation for heat transmission through a circular pipe from Fourier’s law.
34. Explain the modes of heat flow.
35. Write the construction and working of liquid-liquid heat interchanger.
36. Draw a neat labelled diagram of a shell and tube heat exchanger and explain its construction.
37. Derive on equation for heat transfer by conduction through compound Resistances in series.
38. Explain the working of a heat exchanger with a labelled diagram.
39. Describe finned tube heat exchanger and its specific advantages.
40. Describe the conduction of heat through a circular pipe. Give suitable equations for rate of heat transfer and explain terms
41. Describe the conduction of heat through compound resistances in series.
42. Derive an expression for the logarithmic mean temperature difference.
43. Describe liquid heat interchangers. What are its advantages?
44. Explain the working of any one heat exchanger with a labelled diagram.
45. Explain the construction and working of ‘balanced pressure steam Trap’.
46. Describe the construction of a pharmaceutical process vessel with different steam controls.
47. Explain the term ‘steam trap’ giving a suitable examples.
48. Describe steam as an ideal heating medium.
49. With the help of a neat diagram, explain the concept of film and overall heat transfer in forced convention. Deduce relevant mathematical equations.
50. State Fourier’s law. Derive an equation for heat transfer by conduction through a metal wall.
51. Describe the construction, operation, advantages and disadvantages of a Multipass heater.

**Unit-3**

**Chapter 1 Drying**

1. Distinguish drying and evaporation.
2. Give suitable dryers: a) Granular free flowing solids b) Wet bricks before sending to kilns c)Sticky pastesd) Food products like Horlicks.
3. Define critical moisture content and equilibrium moisture constant.
4. Explain the importance of drying in the pharma industry with examples.
5. Define bound water and free moisture content.
6. Mention the factors affecting constant drying rate.
7. What are the applications of FBD?
8. Classify dryers giving suitable examples.
9. Define drying. Give its importance in the manufacture of dosage forms.
10. Explain how are agitator dryers useful to dry pasty and sludgy materials?
11. How do you obtain the rate of drying curve for a given drying operation? Give its applications.
12. Write the mechanism of drying in second falling rate period.
13. Recommend a suitable dryer for drying the following substances and substantiate your answer with at least two reasons: a) Pasty extracts b) Granular solids
14. Describe the drying rate curve for a nonporous granular solid.
15. Describe the principle with the help of a labelled diagram of fluidized bed dryer.
16. List the pharmaceutical applications of freeze drying process. Give salient features of the process.
17. Describe the construction and working of a fluidized bed dryer.
18. Describe the construction and working of a tray dryer.
19. Explain the principle of spray drying with suitable labelled diagram.
20. Describe the drying rate curve.
21. Explain the principle and working of drum dryer.
22. Explain the factors to be considered in the selection of a suitable dryer.
23. Explain the operation and applications of fluidised bed dryer.
24. Describe the function of drum dryer and its uses.
25. Describe the rate of drying curve for a crude fibrous drug.
26. Explain the principle of freeze drying? What are its applications in pharmacy?
27. Compare the operations of spray dryer and tray dryer.
28. Describe the concept of spray dryer. What are its advantages? Compare the spray drying with other methods of drying.
29. Explain the construction and operational details of freeze dryer. Describe its applications in pharmacy.
30. Explain principle, construction and working of freeze dryer.
31. Describe the concept of spray drying. Describe the specific advantages of spray dried product over drum dried material. Also list the pharmaceutical applications.
32. How do you classify dryers? Describe in detail the constant rate and falling rate periods. Add a note on critical moisture content.
33. Discuss the construction, working, advantages and disadvantages of spray dryer.
34. Explain the theory of drying giving more emphasis on rate of drying with suitable graphs.

**Chapter 2 Distillation**

1. State Raoult's law.
2. Name the materials commonly used in packing of fractionating columns.
3. Differentiate between plate towers and packed towers.
4. Describe the construction of any one fractionating column.
5. Distinguish evaporation and distillation.
6. Define mean free path with its importance
7. Distinguish between 'stripping section' and 'rectifying section of a rectifying column.
8. What are the characteristics of packing materials used in fractionating columns?
9. Name the different types of rectifying columns.
10. Define distillation. Mention two applications of it as per IP.
11. Differentiate differential distillation and rectification.
12. Define relative volatility and write its significance.
13. Define-flash distillation'. List applications.
14. What is meant by steam distillation? What are its special advantages?
15. Describe the principle and applications of steam distillation.
16. Describe the construction of bubble cap column. What are its advantages?
17. Describe the bubble cap rectifying column. What are the specific drawbacks of bubble's cap column?
18. Describe one fractionating column of your choice. List its advantages and disadvantages.
19. Describe the construction and working of a distillation apparatus for the preparation of water for injection.
20. Explain the principle and procedure of molecular distillation what are its applications?
21. Distinguish between plate column and packed towers. Describe the types of packing for rectifying columns. How is absolute alcohol made?
22. Explain the principle of fractional distillation and working of fractional distillation unit.
23. Describe fractional distillation. Explain the working of bubble cap column.

**Unit 4**

**Chapter 1 filtration**

1. List the factors influencing the rate of filtration.
2. Write Kozeny-Carman equation and give its significance.
3. Write the mechanism of filter aids.
4. Give the principle of filtration aids.
5. Differentiate pressure filtration and vacuum filtration.
6. List the properties of filter aids.
7. Distinguish filtration and clarification.
8. What are filter aids? Give two examples.
9. Differentiate surface filtration and depth Filtration.
10. What is meant by the wood sinter? List the uses and advantages of sintered glass filter.
11. What is the mechanism of filtration in membrane filter? What are its Advantages and disadvantages of membrane filters?
12. Give the neat labelled diagram of pressure sand filter. What are its Uses?
13. If the slurry contains 25% solids. What type of filtration equipment Employed? Why?
14. Explain the mechanism by which filter aids improve the rate of filtration.
15. Why coagulants are added to slurry before proceedings for filtration? What is its mechanism for improving the rate of filtration?
16. What are the conditions in which pressure sand filter is used? Why?
17. Explain the method of washing the residue with a suitable example of Filtration equipment.
18. What is meant by back washing? How is it achieved in filtration?
19. Suggest a method of filtration using vacuum. Explain its role in the Filtration.
20. Explain the ideal properties of filter media.
21. Compare the features of filter press and filter leaf.
22. What are the characteristics of filter aids?
23. Explain the mechanism of filtration.
24. What are filter aids? Name the filter aids commonly used in pharmacy Practice.
25. Describe the construction and working of a rotary drum filter.
26. Describe the construction and working of leaf filters.
27. Describe the construction and working Of a preferred filter suitable for filtration of high viscous liquids.
28. Describe the construction and working of a Seitz filter.
29. Describe the construction and working of a cartridge filter.
30. Explain any five factors affecting the selection of filtration equipment.
31. Explain the construction and working of filter press.
32. Explain the theories of filtration.
33. Explain the process of washing of the cake in filter press.
34. Explain the construction, working, advantages and disadvantages of filter press.
35. Explain the theories of filtration giving the principle, mechanism and factor affecting the process.
36. With a neat labelled diagram describe the construction and working of a suitable industrial filter for handling of high solid containing slurries.
37. With a neat labelled diagram, describe the construction and working of an industrial filter suitable for clarification of syrups.
38. With neat labelled diagram, describe the construction and working of a chamber press.

**Chapter 2 centrifugation**

1. Write two pharmaceutical applications of centrifugation.
2. What are basket centrifuges? Describe their applications.
3. What are application of basket centrifuges.
4. Write the applications of perforated basket centrifuges.
5. Explain the principle behind centrifugation.
6. What are the factors influencing centrifugal effect?
7. Give the equation for centrifugal effect.
8. What is meant by under-driven filtration type basket centrifuges?
9. Differentiate between sedimentation centrifuges and filtration centrifuges.
10. Name one Example each for sedimentation centrifuge and filtration centrifuges
11. Classify industrial centrifuges. Write construction and working of a perforated basket centrifuges.
12. Give five pharmaceutical application of centrifugal separations.
13. Describe continuous centrifuges. Giving their advantages.
14. Explain the construction and working of semicontinuous centrifuge.
15. Describe the construction and working of supercentrifuge.
16. Explain the construction and working of a under driven perforated basket centrifuge.
17. Describe the theory of centrifugation.
18. Discuss construction and working of a discontinuous centrifuge for solid separation.
19. Describe the construction and working of centrifuge used for the Separation of slurry containing high percentage of solids.
20. Describe the construction and working of centrifuge used for the separation of two liquid phases as in case of emulsions.

**Unit-5**

**Chapter 2 Material of construction, corrosion**

1. Write the applications of glass as materials of construction in the Pharmaceutical industry.
2. Enumerate the types of glass. Mention an example of formulation that is Stored in each type of container.
3. Write the advantages and disadvantages of plastic as packaging Material.
4. Write the uses of rubber as a packaging material.
5. Explain the process of corrosion on a single metal wall.
6. Explain the importance of stainless steel in Pharmaceutical Industry.
7. Write a note on the utility of glass and stainless steel in Pharmaceutical Industry.
8. Describe steel as a material of plant construction.
9. Name five important classes of plastics. Mention their applications in pharmaceutical industry.
10. Describe the steel alloys used in pharmacy practice.
11. What are the properties of glass? What are its applications as material of construction?
12. Describe various types of iron as materials of construction.
13. Classify the materials of Construction. Explain the uses of ferrous metals.

**Chapter: Corrosion**

1. Explain the terms ‘pitting corrosion’ and ‘galvanic corrosion”
2. Give the applications of protective linings and coatings with respect to Corrosion control with suitable examples.
3. What is the role of plastic washers in the corrosions of metals?
4. How are oxide films formed? What are its advantages?
5. Highlight the role of oxygen in the corrosions of metals.
6. Explain the role of temperature on the metal corrosions.
7. Iron corrodes faster than aluminium, even through iron is placed below Aluminium in the electrochemical series why?
8. Impure metal corrodes faster than pure metal under identical conditions.
9. Differentiate chemical corrosions and electrochemical corrosions.
10. Explain the term ‘nisting of iron’ what is its chemical formula?
11. Describe the term ‘passivity’. How is it combat corrosions?
12. Explain the effect of pH on corrosion.
13. Rusting of iron is quicker in saline water than in ordinary water, why?
14. Describe the effect of grain size of the metal on corrosion.
15. Why are two dissimilar metals not allowed to come in contact with each other?
16. Which type of oxide film is more protective against corrosion? Give one. Example of metal, which produces such an oxide film.
17. How does the addition of amines protect against corrosion of iron?
18. What is corrosion? Mention the factors that influence rate of corrosion.
19. Explain measures you suggest to check the problems of corrosion.
20. Write the electrochemical theory of corrosion.
21. Describe various types of corrosion and suggest the methods to tackle the same in pharmaceutical industries.
22. Describe the biological corrosion and suggest the preventive measures.
23. Describe the mechanism of corrosion of iron.
24. Define corrosion. Give its causes. Classify corrosion.
25. Explain ‘galvanic corrosion and pitting’.
26. What is corrosion? Name the various types of corrosion. How can Corrosion be prevented?
27. Describe various types of corrosion and suggest the methods to tackle the same in pharmaceutical industries.

**Chapter 3 Material Handling system**

1. Why improper handling of materials must be avoided?
2. Enlist the objectives of conveying.
3. List two objectives of conveying of solids.
4. What are the differences between bins and silos?
5. Name the conveyors suitable for transporting solids: a) To a long distance and (b) to elevate large quantity of materials in a Closed condition.
6. What are the objectives for using fluidisation for solids transport?
7. Illustrate the concept of solid transport by fluidisation.
8. Describe the principle of pneumatic conveyor used in pharmaceutical Industry.
9. Describe the different types of conveyors used in pharmaceutical Industry.
10. List of advantages of screw conveyor and screw elevator. How do you compare these with pneumatic transport of solids?
11. Describe the construction and working of a screw conveyor.
12. Write the principle of belt conveyor with a neat labelled diagram. Describe the construction and working of belt conveyor system for solid Transport.
13. Name the devices used for transportation of solids. Describe pneumatic Conveyor.
14. Describe the factors influencing the selection of transportation Equipment for solids.