«ԵՐԵՎԱՆԻ ՄԽԻԹԱՐ ՀԵՐԱՑՈՒ ԱՆՎԱՆ ՊԵՏԱԿԱՆ
ԲԺՇԿԱԿԱՆ ՀԱՄԱԼՍԱՐԱՆ» ՀԻՄՆԱԴՐԱՄ

"YEREVAN STATE MEDICAL UNIVERSITY
AFTER MKHITAR HERATSI" FOUNDATION

ԴԵՂԵՐԻ ՏԵԽՆՈԼՈԳԻԱՅԻ ԱՄԲԻՈՆ
DEPARTMENT OF DRUG TECHNOLOGY

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State examination
Questionnaire of Pharmaceutical Technology
2018-2019

1. Introduction to pharmaceutical technology. Prescription orders. Basic steps to follow in compounding drug products. Labels for outpatient prescriptions and inpatient drug orders. Auxiliary labels of medicines. Medical abbreviations.
2. Controlled substances. Weighing: prescription balances, recommended weighing procedures. Volumetric measuring: selection and use of volumetric apparatus.
3. Powders as dosage form. Advantages and disadvantages of powders. Classification. Principles of compounding for powders: particle size reduction and blending.
4. Solitions as dosage form. Definition. Characteristics. Advantages and disadvantages of solutions over other dosage forms. Classification. Principles of compounding solutions. Solvents.
5. Macromolecular solutions. Colloids. Kinetic properties of colloids. Protective colloids. Non-aqueous solutions.
6. Suspensions as dosage form. Definitions. Factors affecting the properties of a pharmaceutical suspensions. Kinetic stability of suspensions. Stokes' law. Sedimentation.
7. Emulsions as dosage form. Definitions. Emulsion types. Determination emulsion types. Principles of compounding emulsions. Emulsifying agents. Mechanism of action of emulsifying agents.
8. Extraction process of raw material. Infusions and decoctions. Factors affecting the extraction process of active ingredients.
9. Ointments as dosage form. Definitions. Advantages and disadvantages. Ointment bases. Classification.
10. Principles of compounding of ointments in pharmacy condition. Incorporation of medications in ointments.
11. Suppositories as dosage form. Advantages and disadvantages. Classification. Suppository bases. Compounding of suppositories in pharmacy condition.
12. Reasons for usage of multicomponent drug dosage forms. Rational and non-rational prescriptions in compounding. Prescriptions representing difficulties and the ways to overcome them. Preparation of dosage forms by prescriptions representing difficulties without consultation with physician.
13. Incompatibility of dosage forms in prescriptions. Classification of incompatibility. Physical or physicochemical incompatibility. Damping and liquefaction of solid powders as an

example of incompatibility. Eutectic mixtures. Immiscibility of ingredients and deterioration in the terms of solubility as an examples of incompatibility.

14. Coagulations of colloid and macromolecular solutions as an example of incompatibility. Lamination of emulsions. Absorption as an example of incompatibility.
15. Chemical incompatibility, definition and classification. "Seeming" chemical incompatibilities. Examples. Formation of precipitates as an example of chemical incompatibility. Causes of precipitation. Sedimentation of cardiac glycosids. Examples.
16. Incompatibility, which is accompanied with color changes, emissions of gases and odorous compounds as an example of chemical incompatibility.
17. Quality management in the drug industry. The principles of quality assurance.
18. Good manufacturing practices for medicinal products. Personnel.
19. GMP. Premises and equipment. Documentation.
20. GMP. Production. Qualification and validation.
21. GMP. Complaints and product recall. Quality control. Inspections.
22. GMP manufacturing environments.
23. Material balance. Classification of process. The Mass Balance Equation.
24. Heat transfer. Methods oh heat transfer. Steam as a heating medium.
25. Drying. The drying of wet solids. Moisture content of wet solids. Wet-bulb and dry-bulb temperature.
26. Types of drying methods. Convective drying of wet solids. Fluidized bed dryers.
27. Conductive drying of wet solids. Radiation drying of wet solids.
28. Spray drier. Freeze drying. Advantages and disadvantages.
29. Technological and physicochemical properties of powders. Process conditions: Hopper design. Characterization of powder flow.
30. Improvement of powder flowability.
31. Tablets as a dosage forms. Quality attributes of tablets.
32. Tablet manufacturing. Stages in tablet formation. Tablet presses. Technical problems during tabletting.
33. Tableting methods. Tablet production by direct compaction. Tablet testing.
34. Tablet excipients. Filler. Disintegrant. Binder .Glidant. Lubricant. Antiadherent. Sorbent. Flavour. Colourant
35. Tablet production via granulation. Pharmaceutical granulation equipments. Wet granulation. Dry granulation.
36. Coating of tablets. Types of tablet coating. Reasons for coating tablets. Basic process requirements for film coating, sugar coating and press coating.
37. Fundamental aspects of the compression powders. Bonding in tablets.
38. Capsules. Hard gelatin capsules. Raw materials. Manufactures. Capsule-filling machines.
39. GMP for sterile pharmaceutical products. Clean rooms for the production of pharmaceutical products. Grades of clean rooms.
40. Premises for the manufacture of sterile medicinal products. Design and construction. Surfacing materials. Services.
41. Environmental control of clean rooms. Air supply. Airflow systems. Temperature and humidity control. Personnel. Cleaning. Isolators.
42. Industrial manufacture of parenteral products. Containers for injections.
43. Materials of injection containers. Types of glass.
44. Glass containers. Properties of glass.
45. Water for Pharmaceutical use. Water pretreatment complex. Water softening. Electrodialysis.

46. Water for injections. Reverse osmosis. Ultra filtration. Distillation. Testing and storage of water for injection.
47. Ampoule washing methods. Preparation of solution. Preservation of parenteral products. Ampoule filing and sealing.
48. Sterility and sterilization. Validation and monitoring.
49. Sterilization methods. Thermal destruction of microorganisms.
50. Sterilization methods. Gaseous sterilization. Radiation. Filtration.
51. Aseptic technique. Production of Large volume parenteral products.
52. Packs and Packaging. The pack as a protection. Mechanical, climatic, environmental, chemical and biological hazards.
53. Packaging materials. Glass and glass containers. Metal and metal containers. Plastic and plastic containers. Paper and board.
54. Introduction to biopharmaceutics. The concept of bioavailability. The concept of biopharmaceutics.
55. Physicochemical factors influencing bioavailability. Dissolution and solubility
56. Physiological factors affecting the dissolution rate of drugs. Drug factors affecting dissolution rate
57. Dosage form factors influencing bioavailability. Influence of the type of dosage form. Aqueous solutions. Aqueous suspensions. Liquid-filled capsules. Tablets
58. Assessment of bioavailability. Absolute and relative bioavailability. Bioequivalence. The biopharmaceutical classification scheme.
59. Principles of dosage form design. Biopharmaceutical aspects of dosage form design.
60. Drug factors of dosage form design. Therapeutic considerations on dosage form design.
61. Time-Controlled Drug Delivery Systems. Benefits of Time Controlled Drug Delivery Systems.
62. Diffusion controlled Drug Delivery Systems. Reservoir Systems. Monolithic Systems.
63. Swelling controlled Drug Delivery Systems. Osmotic controlled Drug Delivery Systems. Degradation/Erosion controlled Drug Delivery Systems.
64. Pulsatile drug delivery systems. Advantages of Pulsatile Delivery. Methodologies for pulsatile drug delivery.
65. Responsive drug delivery systems. Magnetically controlled drug delivery devices. Microchip-based DDS.
66. Time Controlled/Pulsatile Drug Delivery Systems. Stimuli induced pulsatile systems
67. Effervescent tablets. Advantages of effervescent tablets. Applications of effervescent tablets.
68. Fast dissolving tablets. Advantages of Fast dissolving tablets. Techniques for the formulation of fast dissolving tablets.
69. Microencapsulation. Benefits of microencapsulation. Physical methods of microencapsulation
70. Physicochemical and chemical methods of microencapsulation. Application of microencapsulation in medicine and pharmacy
71. Targeted drug delivery. Principal schemes of targeted drug delivery.
72. Drug Delivery Carriers. Pharmaceutical nanosystems.
73. Tablet types. Classification of tablets. Disintegrating tablets. Chewable tablets. Diffusion-controlled release systems.
74. Modified release peroral dosage forms. Formulation methods of achieving modified drug release.
75. Liposomes as a Drug Delivery systems. Advantages. Drug release through liposomal system.
76. Liposome production. Incorporating drugs into the liposome's.
77. Types of skin. Determination of skin type. Permeation of substances through the skin.

78. Excipients in cosmetic formulations: animal fats, waxes (animal, plant, synthetic), hydrocarbon bases and gelling agents. Emollients, emulsifiers, fragrances, dye and pigment ingredients. The role of antioxidants and preservatives in cosmetic products.
79. Cosmetic powders. Classification. Ingredients applied in cosmetic powders. Cosmetic lotions. Classification. Hygenic, medical prophylactic, sun screen and acid lotions. Ingredients used for preparation this lotions. Addition of fragrance (flavor) and dye ingredients in lotions.
80. Semisolid cosmetic preparations. Fillers in composition of heterogeneous cosmetic products. Classification and effects on skin. Emulsion cosmetic creams and classification. Moisturizing, nutrient, protective and winter creams.
81. Cosmetic masks. Classification. Bases and active ingredients used in cosmetic masks. Wax or paraffin masks. Cosmetic scrubs. Classification. Abrasives and keratolytic ingredients etc.
82. Cosmetic preparations for teeth and oral cavity. Tooth powders and mouthwashes. Ingredients used for them and quality control. Toothpastes and applied ingredients in composition of them.
83. Deodorants. Classification. Characterization of biologically active substances. Antiperspirants. Characterization of active substances. Disadvantages. Types of antiperspirants.
84. Plant cells and tissue culture as expression system in protein production. Gene transformation in monocot and dicot plant.
85. The producers (expression systems) commonly used in the biopharmaceutical industry. Post translation modification.
86. Animal cells as a producers of recombinant proteins. Cultivating condition. The immortal cell lines. Immortilization.
87. Comparative characteristics of bacterial, animal and plant cells as a producers.
88. Regulatory system of gene expression. The aim of genetic engineering process. Recombinant DNA technology.
89. Monoclonal antibodies production systems cell line. Hybridomas technology.
90. Animal cells line commonly used in the biopharmaceutical industry. Transgenic animals

Main references

1. Lectures and handouts of compounding drug dosage forms.
2. Lectures and handouts of manufacturing drug dosage forms.

Additional references

1. C. Longley, D. Belcher “Pharmaceutical Compounding and dispensing”, Pharmaceutical Press 2008.
2. Edited by M. Aulton “Pharmaceutics: the science of dosage form design”, 3th edition.

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