**Dosage form design and delivery**

STUDY GUIDE FOR FINAL EXAM (25 April 2018; 10.30-12.30)

Final exam will include 50 multiple choice questions based on the topics in the following table. Each question will be worth 2 points. Important focus areas for each topic and approximate distribution of questions are given below..

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| Sr. No | Topic title | Questions per topic | Study focus areas & level of details to know |
| 1 | Principles of topical and transdermal delivery  Transdermal Systems | 8-12 | * Know about structure of skin and routes of skin penetration * Know about stratum corneum and factors affecting percutaneous absorption * Know about different penetration enhancers * Know important physicochemical properties of drugs for transdermal systems * Know about advantages and disadvantages of transdermal systems * Understand the different types of transdermal systems. First, Second and Third generation transdermal systems * Important points about site of patch application and patient counseling * Potential medication errors possible with Transdermal products |
| 2 | Rheology in Pharmacy | 3-6 | * Define viscosity and its relation to flow * Understand shear rate, shear stress, kinematic viscosity, Fluidity * Understand differences between Newtonian and non-Newtonian flow * Know different types of non-Newtonian systems and their properties * Identify typical rheograms of pseudoplastic, plastic, dilatant flow and understand relations between shear rate/stress and viscosity * Understand relation between time and flow/viscosity (thixotropy) * Importance of these properties to pharmaceutical formulations (storage, flocculated vs. deflocculated systems, sol-gel transition) |
| 2 | Semisolid preparations  Ointments, creams | 3-6 | * Types of semisolid dosage forms, their definitions and differences * Local vs. systemic effect * Different types of ointment bases, their properties, examples * Selection criteria for ointment bases, Preparation methods, quality control * Understand difference between emollient and humectant effect |
| 4& 5 | Hydrogels 1 & 2 | 7-11 | * Types/examples of hydrogels * Crosslinking mechanisms * Properties of hydrogels, relation between degree of crosslinking and properties * Types/examples of stimuli-responsive hydrogels, drug release mechanisms * Applications of hydrogels |
| 6 | Rectal Drug Delivery: Suppositories, gels, enemas | 3-6 | * Understand and describe the anatomy and physiology of the rectum * Advantages & disadvantages of rectal delivery * Understand and be able to describe rectal dosage forms, and factors that may impact effective delivery * Understand the different types of suppository bases and their functions in formulation * Types of drugs delivered rectally and conditions where we use rectal products * Define Rectal Microbicides. Understand factors contributing to effectiveness |
| 7 & 8 | Formulations for women’s health  Vaginal Drug Delivery | 6-10 | * Understand the anatomical and physiological barriers to or considerations for vaginal drug delivery; describe changes with age or pathogenic status * Understand how decrease in estrogen production impacts the vagina and its microflora * Understand factors influencing mucoadhesion * Understand factors in attaining effective drug tissue concentrations in/from the vagina * List and differentiate dosage form options for vaginal drug delivery * Types of drugs delivered rectally and conditions where we use rectal products. What are vaginal microbicide products? |
| 9 | Contraception | 3-6 | * Contraception option effectiveness differences * Recognized the differences in pharmacologic actions of progestin and estrogen * Understand the difference between Matrix vs Reservoir IVRs * Be familiar with the advantages, disadvantages, and limitations of each dosage form platform discussed * Compare and contrast commercially available IVRs, implants, and IUDs * Define MPT and understand application. |
|  | Total | 50 |  |

**SAMPLE QUESTIONS FOR FINAL EXAM**

**Note**: This is an in-class, closed book examination. Standard/traditional calculators without internet / wi-fi capability may be used. However, use of laptop computers, smart phones, and all other devices is strictly prohibited during the exam.

1. **Which of the following is a physical penetration enhancer for transdermal drug delivery that is dependent on drug concentration, applied current, and pH?** 
   1. Phonophoresis
   2. Iontophoresis
   3. Metered dose transdermal spray
   4. Microneedles
   5. Ultrasound
2. **What would be the choice of a semisolid preparation for application on dry & scaly skin where emollient properties of the preparation are beneficial?**
   1. Gels
   2. Ointments
   3. Paste
   4. Cream
3. **You have an extremely water insoluble drug that needs to be incorporated in a suppository formulation, the Oleaginous base will release drug faster.**
4. False
5. True
6. **Conceptra ring is a new contraceptive intravaginal ring (IVR) product which has yet to be marketed and is in early pharmaceutical product development stages (Phase I). The design of the IVR is such that the drug contained in a gel format is encapsulated within a nondrug containing polymeric sheath. The ring is intended for use over a period of 3 months. Based on the design of this IVR what type of ring is it?**
   1. Matrix Ring
   2. Reservoir Ring
   3. Solid Ring
   4. Pod Ring
7. **The normal vaginal pH is 4.2. Which of the following will result in an increase in vaginal pH?**
   1. Bacterial Vaginosis
   2. Intercourse
   3. Menopause
   4. All of the above
8. **All of the following properties make hydrogels popular choice for cell delivery EXCEPT**
   1. Weak mechanical properties
   2. In situ gel forming ability
   3. Tissue-like viscoelastic properties
   4. Very high water imbibing ability
   5. High biocompatibility

Answers to the questions

* + - 1. B
      2. B
      3. A
      4. B
      5. D
      6. A