جامعة طنطا كلية الصيدلة	**Tanta University** **Faculty Of Pharmacy** **Department Of Pharmaceutical Technology**		
	Examination For 4th Level Clinical Pharmacy Students		
	Course Title: Controlled Drug Delivery		
Date: 17/3/2021	**Term : First**	**Total Marks: 75** **Total pages: 5**	**Time allowed:** **2 hours**

You are provided with 75 MCQs together with answers for each question. You need to select one answer for each question and blacken the corresponding circle in the provided answer sheet.

Questions 1-25: **are (True/False) type of questions, select (a) for the true statement and (b) for the false one.**

1- The disadvantage of reservoir devices over matrix diffusion-controlled system is a chance of sudden drug dumping.
2- Modifications in drug release profiles can be used to improve stability, safety and accuracy for dose adjustment.
3- For controlled release drug delivery systems, release kinetics are first order.
4- Colonic drug delivery systems are delayed and targeted drug release systems.
5- Most implanted drug delivery systems are based on swelling, dissolution and diffusion control.
6- Smart drug delivery systems can adjust drug release rates in response to a physiological need.
7- The infusion pump consists of a disc-shaped canister made of light-weight biocompatible titanium which contains a collapsible welded bellow
8- Smart drug delivery system involving gold nanocage covered with polymer that responds to light is loaded by the drug by shaking the cages in a solution of the drug at a temperature above the gold critical temperature
9- Osmotic pressure-controlled systems are osmotic pumps for oral controlled drug delivery.
10- Osmotic drug delivery systems typically consist of a drug core containing osmogen that is coated with a permeable membrane.
11- Liquid oral osmotic (L-OROS) system contains an osmotic core with the liquid drug.
12- Drug with elimination half-life of eight hours or more are sufficiently sustained in the body, when administered in conventional dosage from
13- Drugs with a short half-life (less than 2 hours) are difficult to be prepared as sustained release systems because the dosage form may contain a prohibitively large quantity of the drug.
14- Drugs with low therapeutic index are unsuitable for incorporation in sustained release formulations due to the possibility of dose dumping if the system fails in the body.
15- According to BCS, drugs that are put in class III (High permeability -Low solubility) and class IV (Low solubility-Low permeability) are considered as poor candidates to be formulated as a CR dosage form
16- Drugs exhibiting an absorption window are unsuitable for targeted drug delivery.

17- Delivery of the drug to the body in desired concentrations is seriously hampered in case of drugs undergoing extensive hepatic first pass metabolism, when administered in sustained release forms.
18- Gastro-retentive drug delivery systems are targeted and controlled release systems.
19- Anti-hypertensive drugs are preferred to be taken in the early morning.
20- Pulsatile drug delivery systems are feedback regulated drug delivery systems in which the drug concentration (ideally at the drug target site) is measured through a sensor and, depending on the ideal drug concentration, release is either increased or slowed down.
21- Extended release products allow a reduction in dose and dosing frequency.
22- Controlled-release systems aim to control the plasma concentration of the drug after administration by various possible routes.
23- Colonic drug delivery has attracted interest primarily for systemic delivery in diseases of the colon such as Crohn's disease, ulcerative colitis and colorectal cancer.
24- Patients with rheumatoid arthritis suffer from pain more strongly in the morning than in the night.
25- The cortisol levels are higher in the morning and decline throughout the day.

26- The fluctuations in plasma drug levels are minimum for:
a- Pulsatile drug delivery systems
b- Controlled drug delivery systems
c- Delayed drug delivery systems
d- Sustained drug delivery systems

27- Implantable drug delivery systems provide:
a- Controlled drug delivery
b- Dose reduction
c- Treatment for long time
d- All of them

28- Administration of drugs having short *in vivo* half-lives may be achieved by:
a- Controlled drug delivery
b- Intravenous infusion
c- Implants
d- All of them

29- Implantable drug delivery systems are:
a- Easily in shutting off release if necessary.
b- More wasteful of the drug
c- Relatively less expensive
d- Administered easily compared with conventional dosage forms

30- Magnetically controlled release systems are:
a- Biodegradable systems
b- Implantable pump systems
c- Non-biodegradable system
d- Both (b) and (C)

31- In magnetically controlled implantable systems, the following are true except:
a- The drug release kinetics is manipulated by external stimuli.
b- Drug targeting is achieved
c- It is on off release system
d- Designed by uniformly dispersing small magnetic beads within a polymer

32- The infusion pump as an implantable pump system is:
a- An electro-mechanical system that utilizes a fluorocarbon propellant
b- The delivery rate is adjusted by changing the propellant concentration in the pump reservoir
c- Driven by an external energy source
d- None of the above

33- Smart drug delivery via thermo-triggered squirting is:
a- A method for delivering nanoparticles to a specific site of action using temperature-triggered squirting.
b- Encapsulating the nanoparticles in an oil/water emulsion inside a hydrogel.
c- Working by heating the hydrogel capsules with the high mechanical strength above a critical temperature
d- All of the above

34- From the MEMS devices, the self- administering devices have the following except:
a- A prolonged effect
b- Reservoirs filled with different drugs
c- External sensors
d- A variety of drug release patterns

35- The release of drug from Smart Drug Delivery System Involving Gold Nanocage depends on:
a- External stimuli
b- Laser light
c- Heating effect
d- All of them

36- Reservoir implantation devices are different compared with smart pills in the following:
a- Less cost
b- Refill process is easier
c- Less sophisticated in technology
d- All of them

37- Microneedles are fabricated with channels of so small diameters to:
a- Protect skin
b- Avoid pain
c- Facilitate drug delivery
d- All of them

38- Microneedles are the following except:
a- Long enough to penetrate the stratum corneum
b- Created by macro-fabrication technique
c- Short enough to avoid nerves located in the dermis
d- Trans-dermal devices

39- Smart pills are:
a- Microelectromechanical in vivo devices
b- Matchstick sized device can be implanted into the body of a patient.
c- Equipped with an external sensor.
d- All of the above

40- Reservoir implantation devices can be:
a- Activated by remote control
b- Activated on a set time bases
c- Automatically triggered by sensors built into the device that detect when the drug needs to be administered.
d- All of the above

41. Which of the following best define liposomes:
a. Lipid vesicles with or without cholesterol
b. Prepared using phospholipids
c. Lipid vesicles with a size range in the nano-scale
d. All of the above

42. Select the correct statement regarding liposomes:
a. Multilamellar vesicles are suitable for entrapping hydrophobic drug
b. Unilamellar vesicles contain high lipid to aqueous core ratio
c. Unilamellar vesicles are more suitable for hydrophobic drugs
d. Multilamellar vesicles contain high aqueous core to lipid ratio

43. The following are considered true for liposomes, except:
    a. Ease of large scale production
    b. Liable to degradation by oxidation
    c. Can entrap hydrophilic and lipophilic agents
    d. Biocompatible

44. Down Sizing of lipid vesicles must be conducted below the transition temperature of the used lipid.
    a. True b. false

Questions 45-49 can be answered using the following options:

a. Ethanol injection b. Ether injection c. Reverse-phase evaporation

45. Produces very diluted liposomal dispersion
46. May affect the stability of the encapsulated drug due to the used high temperature
47. Based on the formation of inverted micelles
48. Form azeotropic mixture that makes it difficult to remove the organic solvent
49. Freeze and thawing is a process usually performed to increase the entrapment of lipophilic drugs within the lipid vesicles
    a. True b. false

50. What is *true* regarding niosomes:
    a. Prepared using nonionic surfactant with cholesterol
    b. Prepared using a combination of nonionic surfactants and phospholipids
    c. Less stable compared to liposomes
    d. Nonionic surfactants are prone to degradation by oxidation

51. Select the correct order of liposome formation by thin hydration technique:
    a. Aqueous lipid solution, thin film formation, dilution with ethanol, sonication
    b. Lipid solution in organic solvent, thin film formation, hydration, sonication
    c. Lipid solution in organic solvent, hydration, thin film formation, sonication
    d. Both b and c are possible

52. Pro-liposomes formation involves drying the lipid film over soluble and inert carrier
    a. true b. false

53. The following is true for gastro-retentive drug delivery system, except:
    a. Suitable for antacid drugs
    b. Used for selective drug release in the colon
    c. Suitable for basic drugs
    d. Suitable for drugs with narrow therapeutic window in upper intestine

54. The size of expandable gastro-retentive tablets should be bigger than pyloric sphincter.
    a. True b. False

55. Density more than 1.0 cm^3 is required to prepare floating tablets.
    a. True b. False

56. The following can be used in preparation of gastro-retentive devices, except:
    a. Zinc oxide as filler
    b. Superporous hydrogel
    c. Citric acid and bicarbonate mixture
    d. Cholesterol

57. For gastro-retentive system, single unite design is necessary for the success of the following system:
a. Bioadhesives b. floating c. Expandable d. high density

58. Device failure and dose dumping is possible in case of gas generation floating system:
a. True b. False

59. For the preparation of mucoadhesive gastriretentive device, the used polymer should have the following property:
a. Large molecular weight
b. Large number of hydrogen bonding forming groups
c. High water solubility
d. Both a and b

60. Superporous hydrogel is used in the preparation of low density gastroretentive system.
a. True b. False

61. SLN suffers from poor drug loading capacity.
a- True b- False

62. All types of NLCs can be formulated using solid lipids only
a- True b- False

63. Imperfect NLCs should be formulated from mixture of glycerides with different fatty acids.
a- True b- False

64. Multiple type NLC requires trace amount of oil.
a- True b- False

65. Amorphous type NLC can be fabricated without oily components.
a- True b- False

66. The role of hydroxyoctacosanyl- hydroxystearate in preparation of NLCs is to ...
a- increase water content b- decrease the drug entrapment
c- inhibit crystallization of lipids d- increase melting point

67. SLN is more suitable for lipophilic drugs.
a- True b- False

68. Lipid drug conjugates can decrease the loading capacity of hydrophilic drugs.
a- True b- False

69. Addition of warm microemulsion of solid lipid to high amount of water under rapid stirring can produce SLN.
a- True b- False

70. Drug targeting to the liver using standard liposomes is called active targeting.
a- True b- False

71. Incorporation of drug in specific pharmaceutical carrier labeled with a targeting moiety will provide passive targeting.
a- True b- False

72. The vascular system of tumor is leaky.
a- True b- False

73. The drug is retained in the tumor tissue due to poor lymphatic drainage.
a- True b- False

74. Incrorporation of PEG in liposomes can increase its circulation time.
a- True b- False

75. Labelling liposomes with antiobody can increase their circulation period.
a- True b- False

End of exam