

Duration: 3 hours

Total Marks: 75

- NB: 1. All questions are compulsory.**  
**2. Figures to the right indicate full marks.**  
**3. Draw neat labelled diagrams wherever necessary.**

- Q. 1. Multiple Choice Questions. Write the Correct Option (Answer all)** 20
- 1 Which of the following is a system comprising of a rate-controlling polymer matrix throughout which a drug is dissolved or dispersed? 1
    - a) Monolithic system
    - b) Micro-reservoir system
    - c) Reservoir system
    - d) Sandwich system
  - 2 Identify the polymer that would release the drug by surface erosion mechanism 1
    - a) Poly(lactic-co-glycolic acid)
    - b) Polyanhydrides
    - c) Polycaprolactone
    - d) Polyvinyl alcohol
  - 3 Which type of polymer has chains interconnected by bonds, forming a three-dimensional network that enhances its mechanical strength and stability? 1
    - a) Linear polymer
    - b) Branched polymer
    - c) Crosslinked polymer
    - d) Unbranched polymer
  - 4 Which amongst these is a hydrophobic, cellulose-based polymer finding applications in sustained-release? 1
    - a) Hydroxypropyl Methylcellulose
    - b) Sodium Carboxymethyl Cellulose
    - c) Hydroxypropyl Cellulose
    - d) Ethyl Cellulose
  - 5 Which of the following is an advantage of microencapsulation? 1
    - a) Prevent oxidation of active ingredients
    - b) Decrease stability of APIs
    - c) Increase adverse effects
    - d) Decrease shelf life
  - 6 Which of the following techniques is most commonly employed for applications requiring highly consistent microcapsule size? 1
    - a) Pan coating
    - b) Multiorifice-centrifugal technique
    - c) Spray drying
    - d) Phase separation-coacervation technique
  - 7 A mucoadhesive buccal tablet is being developed. What key characteristic should the tablet have to ensure sustained drug release? 1
    - a) Low mucoadhesive strength
    - b) High polymer concentration with controlled swelling
    - c) High solubility in saliva
    - d) Rapid dissolution in the oral cavity



- 8 Which theory of mucoadhesion is based on the interpenetration of polymer and mucin chains? 1  
a) Electronic theory  
b) Diffusion theory  
c) Wetting theory  
d) Fracture theory
- 9 What is the primary mechanism by which drug release is controlled in an Alzet osmotic pump? 1  
a) Diffusion through the membrane  
b) Erosion of the drug core  
c) Osmotic pressure driving water into the core  
d) Chemical reaction within the implant
- 10 A gynaecologist is considering a new IUD design with a silver core. What is the primary advantage of adding silver to the IUD? 1  
a) To increase hormone release  
b) To reduce copper fragmentation and prolong the device's lifespan  
c) To enhance contraceptive efficacy  
d) To make the device radiopaque
- 11 What is the function of the release liner in a transdermal patch? 1  
a) Increase the patch's adhesion  
b) Provide structural support  
c) Enhance drug release rate  
d) Protect the adhesive and drug during storage and before application
- 12 Which of the following tests is used to evaluate the adhesive strength of a transdermal patch? 1  
a) In vitro drug release test  
b) Moisture content test  
c) Peel test  
d) Weight uniformity test
- 13 What is the role of bicarbonates in an effervescent floating system? 1  
a) They liberate carbon dioxide  
b) They neutralise stomach acid  
c) They act as a binding agent  
d) They dissolve the drug
- 14 Which floating system forms a cohesive gel barrier in the stomach? 1  
a) Raft-forming systems  
b) High-density system  
c) Osmotic system  
d) Bioadhesive system
- 15 A common preservative used in nasal sprays is: 1  
a) Sodium chloride  
b) Benzalkonium chloride  
c) Ethanol  
d) Polyethylene glycol
- 16 This system uses a piezoelectric crystal in a pulmonary drug delivery system. 1  
a) Ultrasonic nebulizer  
b) Air jet nebulizer  
c) Aerosol  
d) Metered dose inhalers



- 17 Which substance is often used as a fusogen in the production of monoclonal antibodies? 1  
 a) Ethanol  
 b) Methanol  
 c) Polyethylene glycol  
 d) Acetone
- 18 In nanoparticle characterisation, which method determines particle size? 1  
 a) Light microscopy  
 b) Gel chromatography  
 c) Photon correlation spectroscopy  
 d) UV-Vis spectrophotometry
- 19 The material used in the construction of a Lacrisert is: 1  
 a) Hydroxypropyl methylcellulose  
 b) Hydroxypropyl cellulose  
 c) Hydroxyethylcellulose  
 d) Methylcellulose
- 20 Which polymer is responsible for thermo-sensitive hydrogel formation at ocular surface temperature? 1  
 a) Pluronics (Poloxamer)  
 b) Polyvinyl alcohol  
 c) Sodium alginate  
 d) Chitosan
- Q. 2. Answer Any TWO** 20
- 1 Discuss the criteria for selecting a drug to be developed as a sustained-release delivery system 10
- 2 Outline the applications of microencapsulation and compare the techniques of spray drying and spray congealing. 10
- 3 List the types of ocular inserts and describe the non-erodible variants in detail. 10
- Q. 3. Answer Any SEVEN** 35
- 1 Describe dissolution-controlled systems designed for extended drug delivery. 5
- 2 Define polymers and discuss their properties relevant to controlled-release drug formulations. 5
- 3 Provide an overview of mucoadhesive polymers. 5
- 4 Explain the basics, benefits, and drawbacks of dry powder inhalers. 5
- 5 Summarise the historical progression of intrauterine devices. 5
- 6 Discuss transdermal permeation enhancers. 5
- 7 Examine high-density and inflatable systems as gastroretentive delivery methods. 5
- 8 Briefly discuss targeted drug delivery, including its benefits and limitations. 5
- 9 Provide a brief overview of in-situ gelling systems for ocular drug delivery. 5