Ref. No. : Ex/PG/BME/PE/T/115A/2025

MASTER OF BIO-MEDICAL ENGINEERING FIRST YEAR FIRST SEMESTER - 2025

ENGINEERING OF BIOMATERIALS FOR DRUG DELIVERY

Time : 3h Full Marks : 100

1. State whether the statements are true or false (**ANY TWENTY**): (20X1)=20

i. EPR effect is observed in normal tissue cells.
ii. Sonophoresis and iontophoresis jointly can improve drug delivery rate.
iii. Gastric fluid can destroy insulin.
iv. Chemotherapeutic agents are used only to treat cancer patients
v. pH dependent transport is observed in lipid soluble drugs.
vi. Presence of food accelerate rate of absorption.
vii. Tetracycline should be taken with milk to improve its absorption.
viii. Rate of absorption of a drug can be improved by reducing particle size.
ix. Drug poisoning can be treated by hemodialysis for plasma bound drugs.
x. Chloroquine has an affinity for Bone & teeth.
xi. Inhaler is an example of magnetically activated drug delivery system (DDS).
xii. Drug action can be prolonged by plasma protein binding
xiii. Permeability of blood brain barrier decreases during Parkinsonism.
xiv. In Greek pharmacon means drug delivery.
xv. Natural polymers are never used in drug delivery system.
xvi. Drug is always excreted through urine.
xvii. In membrane permeation control DDS drug release follows Fick's law of diffusion.
xviii. Drug metabolism often converts lipophilic compounds into hydrophilic products.
xix. Plasma bound drug do not provide any action.
xx. First pass metabolism is an important determinant of bioavailability.
xxi. In mechanically activated DDS release of drug is proportional to force applied.
xxii. Drug action can be prolonged by plasma protein binding
xxiii. Prolongation of drug action can be achieved by increasing renal excretion.

2. Answer any six questions. (6X10)=60

i. Define drug as per WHO. What do you mean by drug delivery system? Propose an ideal drug delivery system with the help of an example and diagram.
ii. Write short note on pH activated drug delivery system. How this pH activity could be utilized to fabricate a feedback regulated DDS for insulin delivery.
iii. Write effect of pH in renal excretion of drugs. Differentiate between ion activated drug delivery andiontophoresis activated DDS.
iv. What do you mean by clearance? If plasma conc. of an intravenous injection (500mg) is 10mg/L and rate of elimination is 100mg/h then find $t_{1/2}$.
v. Write two advantage and disadvantage of electronic drug delivery system.Write a short note on electronic capsule.

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vi. Write the main difference between matrix and reservoir system. Write a short note on vapour pressure activated drug delivery system

vii. Write a short note on Colon specific drug delivery system. Write a short note on Blood-brain barrier with diagram.

viii. Write a short note on Bio-erosion regulated DDS and self-regulated drug delivery system.

3. Answer any eight from the following: (8X2.5)=20

i. Write the type of dosage forms present in conventional drug delivery system.

ii. Write attributes of drugs with high first pass metabolism.

iii. What is the major cause of individual variation in drug response?

iv. Provide one example of: Antioxidant, Surfactant, Diluent, Lubricant, Humectant.

v. Write the sites involved in drug metabolism and excretion.

vi. Name one pH sensitive polymer used in DDS. What do you mean by Sonophoresis?

Define/Explainthe following:

vii. First pass metabolism

viii. Bioavailability(Provide diagram)

ix. Pharmacokinetics

x. Prodrug