BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.PHARM **SEMESTER : II**
BRANCH: PHARMACY **SESSION : SP/19**

SUBJECT: MPH203T, COMPUTER AIDED DRUG DELIVERY SYSTEM

TIME: 3 HOURS **FULL MARKS: 75**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 15 marks and total 105 marks.
2. Candidates may attempt any 5 questions maximum of 75 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) What the importance of intestinal permeation *in silico* simulation in GIST. [7]
Q.1(b) Discuss briefly following factors in *in silico* simulation: (a) ionization constant, and (b) drug metabolism. [8]

Q.2(a) Draw and discuss ACAT model to simulate *in vivo* drug absorption behaviour. [7]
Q.2(b) Discuss the role of transporters to adequately describe *in silico* drug absorption using suitable example. [8]

Q.3(a) Discuss the importance of virtual trials in simulation studies with examples. [7]
Q.3(b) Explain various approaches used to assess the relationship between *in vitro* and *in vivo* in simulation studies. [8]

Q.4(a) Using suitable example explain the importance of PSA in *in silico* prediction. [7]
Q.4(b) Explain central composite design in designing pharmaceutical formulation of any choice. [8]

Q.5(a) Discuss level 1 computer simulation of the whole body organism. [7]
Q.5(b) Using suitable example explain the role of input parameters in ASF (influx transporters) and dissolution rate constant to adequately describe the *in silico* plasma concentration time profile. [8]

Q.6(a) Discuss the effect of food on carbamazepine regional absorption using simulation technique. [7]
Q.6(b) A 2^2 factorial design (independent variables: X_1 and X_2) was conducted and following result was obtained: [8]

Formulation	Potency		Response (Y, min)
	X_1	X_2	
1	10.0	50.0	9.9
2	15.0	50.0	8.2
3	10.0	100.0	9.4
4	15.0	100.0	4.7

Calculate: (a) Transformed values of X_1, X_2 and X_1X_2 at each levels, (b) the response equation, (c) any optimized formulation combination with $y<5.0$.

Q.7(a) Explain the influence of formulation effect in GIST using suitable examples. [7]
Q.7(b) A total of 100 mg of three components, stearic acid (A), starch (B), and DCP (C) are to be added to a tablet formulation. Dissolution time was measured in a simplex design with the following result: [8]

Composition	Dissolution time (min)
100 % A	295.0
100 % B	5.9
100 % C	51.4
50% A, 50 % B	26.6
50% B, 50 % C	16.6
50% A, 50 % C	125.5
1/3A, 1/3B, 1/3C	38.0

Calculate:
(i) The simplex equation coefficients.
(ii) Give a combination with very fast dissolution.
(iii) Give a combination that has a dissolution time of 90 min.

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