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

CLASS: M.PHARM **SEMESTER: I**
BRANCH: PHARMACY **SESSION: MO 2025**

SUBJECT: MPH103T MODERN PHARMACEUTICS

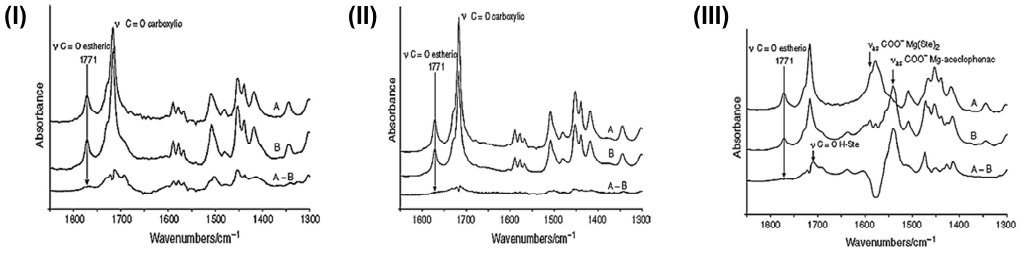
TIME: 3.00 Hours **FULL MARK: 75**

INSTRUCTIONS:

1. The missing data, if any, may be assumed suitably.
2. Before attempting the question paper, be sure that you have got the correct question paper.
3. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
5. Answer any five questions.

1a. Explain the significance of drug–excipient compatibility studies. Present a flowchart showing the systematic use of analytical techniques in excipient selection, and describe any two analytical methods employed for compatibility evaluation. [7]

1b. Based on the FT-IR spectra in the figure below for Aceclofenac mixtures with Aerosil 200 (I), HPMC (II), and magnesium stearate (III), critically analyze each drug-excipient system in the freshly prepared mixture (A) and after 3 months of storage (B). Explain how the difference spectra (A–B) support the selection of suitable excipients. [8]



2a. Write the general form of a second-degree polynomial model and determine the number of parameters (p) in the second-degree model when the number of control variables is k. [7]

2b. Create a design matrix by using the central composite design (CCD) when the number of control variables is 2 and the number of center points is 3. [8]

3a. Discuss the key formulation components and evaluation parameters of a pharmaceutical suspension. [7]

3b. Explain the DLVO theory in the context of colloidal stability for pharmaceutical suspensions. [8]

4a. Derive the Weibull model to demonstrate the dissolution process and write down its limitations. [7]

4b. Calculate C_{max}, t_{max}, AUC_{0-t}, $AUC_{0-\infty}$, K_{el} and $t_{1/2}$ from the plasma concentration vs. time data following the administration of a tablet containing 200 mg drug without using graph paper. [8]

Time (hr)	Plasma Concentration (ng/mL)
0	0
0.5	225
1	415
1.5	850
2	1200
2.5	1080
3	930
4	710
6	450
8	300
10	200
12	120
24	10

PTO

5a. Explain compressibility, compactability, and tabletability with suitable figures. [7]
5b. Derive the Heckel equation to demonstrate the volume reduction mechanism during compression. [8]

6a. Discuss the surface tension and interfacial film formation theory in relation to emulsion stability. [7]
6b. Write a short note on Self-Microemulsifying Drug Delivery Systems (SMEDDS). [8]

7a. Create a design matrix by using Box-Behnken experimental design with 3 control variables and 3 levels for each control variable. The number of center points will also be 3. [7]
7b. Calculate the similarity factor (f2) of the given dissolution profile of the test and reference tablets, both containing 600 mg of the drug. [8]

	Cumulative % drug release	
Time (hr)	Reference tablet	Test tablet
0	0	0
0.5	12	14
1	20	22
1.5	31	34
2	38	45
2.5	49	57
3	62	68
4	69	79
6	75	86
8	82	92
10	88	96
12	92	98

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