



- Notes :
1. All questions are compulsory.
 2. All questions carry as indicated marks.
 3. Illustrate your answers wherever necessary with the help of neat sketches.

- 1. Short note answer any ten. 10x2 =20**
- a) What is biological source of Ephedrine and Piperine.
 - b) Draw the structure of Carvone and Menthol.
 - c) What are terpenoids? Give examples.
 - d) Draw the structure of Citral and caffeine.
 - e) Define extraction. Enlist its type.
 - f) Enlist different methods for isolation of volatile oils.
 - g) Enlist different methods for fractionation.
 - h) What is biological source of Nicotine and Luteolin.
 - i) What are biomarkers? Give examples.
 - j) Enlist lead compound for artemisinin and andrographolides.
 - k) Clinical trials
 - l) LCMS
- 2. Short essay answer any five. 5x7= 35**
- a) Write a note on Radio tracing techniques.
 - b) Explain Biosynthesis, Isolation, Characterization and purification Strychnine.
 - c) Explain History of herbs as source of drugs and drug discovery.
 - d) Explain Selection and optimization of lead compounds for artemisinin.
 - e) Describe Clinical studies emphasizing on phases of clinical trials.
 - f) Write a note on protocol design for lead molecules.
 - g) Explain recent advance in extractions with emphasis on selection of method and choice of solvent for extraction.
- 3. Long essay answer any two. 2x10 =20**
- a) Describe separation of phytoconstituents by latest CCCET, SCFE techniques including preparative HPLC and Flash column chromatography.
 - b) Explain Biosynthesis, Isolation, Characterization, purification of Umbelliferon Or Cucurbitacin with its importance in herbal industries.
 - c) Discuss structure elucidation of Kaempferol OR Glycyrrhizin by spectroscopic techniques like UV, IR, MS, NMR (1H, 13C)
