



- 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)

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