

Roll Number -----

(Total Number of Questions 13)

(Total number of Printed Pages 01)

Programme	B. Pharmacy
Semester	7 th
Subject	Instrumental Methods of Analysis
Subject Code	BP701T
Paper ID	78387
Time	3Hours
Maximum Marks	75

Instructions to Candidates: No supplementary/continuation sheet will be issued to the candidates. Answer the questions precisely.

*Section A consists of Ten parts of 2 marks each (Objective Type); Attempt **ALL**.

Section B consists of Three questions carrying 10 marks each (Long Answer); attempt any **TWO.

***Section C consists of Nine questions carrying 5 marks each (Short Answer); attempt any **SEVEN**.

Section A

(10 X 2 = 20)

1. Give very short answers to the followings (2 marks each):

i.	Name the appropriate technique to determine elemental impurities.
ii.	What is the wavelength range corresponding to UV-Visible spectroscopy?
iii.	In which technique Excitation and emission monochromators are used?
iv.	In IR spectroscopy, by what reason, the vibration between atoms is caused?
v.	Which technique is used to analyse colloidal system and why?
vi.	Define R _f value. What is its importance?
vii.	Which type of gel is mostly used for DNA separation?
viii.	Give two examples of IR transparent materials.
ix.	State the principle of Ion exchange chromatography.
x.	Give the difference between fluorescence and Phosphorescence.

Section B

(2 X 10 = 20)

2.	What are the sampling techniques used in IR spectroscopy?
3.	What do you mean by HPLC? Explain different parts of HPLC instrument.
4.	Write down short note on light sources and detectors used in UV Visible spectroscopy.

Section C

(7 X 5 = 35)

5.	What are the different modes of vibrations in poly atomic molecules?
6.	Define isobestic point.
7.	Enumerate applications of atomic absorption spectroscopy.
8.	Write a short note on factors affecting fluorescence.
9.	What is the principle of flame photometry?
10.	Differentiate between normal phase and reverse phase chromatography.
11.	Give a brief note on detectors used in gas chromatography.
12.	Classify different types of chromatography used in pharmaceutical sciences.
13.	What are the uses of gel chromatography?

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Section A

(10 X 2 = 20)

1. Give very short answers to the followings (2 marks each):

i.	Define Retention Time. Give its importance.
ii.	Briefly tell about Reverse Phase Chromatography.
iii.	Write about Carrier gases used in Gas Chromatography.
iv.	What is Bathochromic shift?
v.	Name two UV Detectors.
vi.	Give two examples of IR transparent materials.
vii.	Define the term Fluorescence and Phosphorescence.
viii.	Give Principle of Atomic Absorption Spectroscopy.
ix.	Types of Pumps in HPLC.
x.	Principle of Ion Exchange Chromatography.

Section B

(2 X 10 = 20)

2.	Give principle and details of components of Double beam UV-Visible Spectrophotometer.
3.	Explain principle, instrumentation and application of HPLC.
4.	Discuss the various factor affecting molecular vibrations in IR Spectroscopy.

Section C

(7 X 5 = 35)

5.	Explain the types of molecular vibrations in IR spectroscopy.
6.	Give principle and instrumentation of Flame Photometer.
7.	Write a note on methodology involved in Thin layer Chromatography.
8.	Explain in brief the Affinity chromatography.
9.	Classify Ion Exchange Resins and explain the principle of Ion exchange chromatography.
10.	Write a note on factors affecting fluorescence.
11.	Describe various columns used in Gas Chromatography.
12.	Write principle and application of paper chromatography.
13.	Briefly write about theory and principle of Gel Permeation chromatography.

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Section-A**(10X2=20)**

1.	Give very short answers to the followings:
i.	What do you mean by derivative spectroscopy?
ii.	Define molar extinction coefficient and give its significance.
iii.	Differentiate between fluorescence and phosphorescence.
iv.	Give the various modes of vibrations shown by CO ₂ , H ₂ O and CO.
v.	What are the various types of interference in atomic absorption spectroscopy?
vi.	Define R _f values.
vii.	Explain the principle of paper chromatography.
viii.	What do you mean by reverse phase chromatography?
ix.	What is partition coefficient?
x.	Write applications of Ion exchange chromatography.

Section- B**(2X10=20)**

2.	Explain the nature of electromagnetic radiations. Describe the usefulness of emission and absorption of energy by molecules in different techniques of pharmaceutical analysis.
3.	Write a note on- a) Sampling in IR spectroscopy. b) FTIR spectrophotometer.
4.	Discuss principle, working and application of GC.

Section- C**(7X5=35)**

5.	Explain the factors affecting the fluorescence.
6.	Give principle and instrumentation of flame photometer.
7.	Describe instrumentation and application of UV Spectrophotometry.
8.	What is the principle of separation on column chromatography? Describe the detailed methodology to run a partition column chromatography.
9.	Write a brief note on capillary electrophoresis.
10.	What are the various column used in HPLC? Enlist the criteria used for solvent selection in HPLC.
11.	What are the types of column used in Gas chromatography? What are the advantages and dis-advantages of capillary column?
12.	What are ion-exchange resins? Classify them.
13.	Write in brief about affinity chromatography.

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Section-A**(10X2=20)**

1.	Give very short answers to the following:
i.	Define spectroscopy.
ii.	Define hyperchromic shift with examples.
iii.	What is a triplet electronic state?
iv.	Write the fundamental vibrations of IR spectroscopy.
v.	What do you understand by Nephelometry?
vi.	Differentiate between adsorption and partition column chromatography.
vii.	What is the principle of capillary electrophoresis?
viii.	What is the function of derivatization in GC?
ix.	What is the use of a guard column in HPLC?
x.	Write applications of affinity chromatography.

Section- B**(2X10=20)**

2.	Explain the UV double beam instrumentation and Discuss how UV plays a major role in drug analysis.
3.	Discuss C=O stretching in IR spectra of various carbonyl compounds. Explain the sampling technique in IR spectroscopy.
4.	Explain the principle and various development techniques used in Paper chromatography.

Section- C**(7X5=35)**

5.	Define quenching. How does it affect the fluorescence intensity?
6.	What are the advantages of atomic absorption spectrophotometry over flame emission spectroscopy?
7.	Describe the instrumentation and application of flame photometry.
8.	What is the principle of separation in Thin Layer chromatography? Describe the detailed methodology to run a TLC process.
9.	Write a brief note on Gel electrophoresis.
10.	What are the various columns used in HPLC? Enlist the criteria used for solvent selection in HPLC.
11.	Discuss the effect of temperature in GC. Also, describe the detectors used in GC.
12.	What are ion-exchange resins? Classify them.
13.	Write in brief about Gel Chromatography.

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Section- A (10 X 2 = 20)

1.	Give a very short answers to the followings:
i.	What is electromagnetic and write its nature?
ii.	Define auxochrome with examples.
iii.	What is RF value?
iv.	What is a monochromator and write its uses?
v.	Hooke's law for bond property and absorption trends.
vi.	Difference between fluorescence and phosphorescence.
vii.	What are the modes of vibration in IR?
viii.	What is chromatography write its two applications?
ix.	Define electrophoresis and its two applications.
x.	What is affinity chromatography write its two applications?

Section- B (2 X 10 = 20)

2.	Discuss principal, instrumentation, and application of UV-VIS spectroscopy.
3.	Write principle, instrumentation and application of flame photometry.
4.	Discuss principal, instrumentation and application of infra red spectroscopy.

Section- C (7 X 5 = 35)

5.	Describe different types of transitions involved in UV- VIS spectroscopy with examples.
6.	Define quenching and its types in detail with examples.
7.	State the spectral and fingerprint regions in IR spectroscopy.
8.	Outline the effect of substituents on electromagnetic radiation absorption.
9.	Provide a brief overview of thin layer chromatography (TLC).
10.	Describe the principle and applications of atomic absorption spectroscopy (AAS).
11.	Write principle and application of high performance liquid chromatography (HPLC).
12.	Summarize the principle and applications of nepheloturbidometry.
13.	Give a brief description of ion exchange chromatography.

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Section-A (10X2=20)

1.	Give very short answers to the followings:
i.	Define nephelometry and turbidometry.
ii.	Write van deemter equation.
iii.	What is isocratic elution?
iv.	State the principle of affinity chromatography.
v.	What is λ_{max} ? What is effect of solvent polarity on λ_{max} ?
vi.	Differentiate between fluorescence and phosphorescence.
vii.	Name the gels used in gel electrophoresis.
viii.	What is the principle of atomic absorption spectroscopy?
ix.	Define retention time (R_t) and retardation factor (R_f).
x.	What is the functional group region and finger print region in IR?

Section- B (2X10=20)

2.	Explain the basic principle and sample handling in IR spectroscopy. Discuss the various factors affecting vibrational frequency.
3.	Describe the different component of a UV-visible spectrophotometer with the help of a well labelled diagram.
4.	Give principle, instrumentation and application of gas chromatography.

Section- C (7X5=35)

5.	Describe various factors affecting the fluorescence intensity of molecules.
6.	Explain the electronic transitions taking place in UV spectroscopy.
7.	Write the brief methodology involved in thin layer chromatography.
8.	Give principle and instrumentation of flame photometer.
9.	Draw a block diagram of HPLC.
10.	Write a note on factors affecting electrophoresis.
11.	Comment on stationary phases used in ion exchange chromatography (IEC).
12.	Briefly write a note on gel permeation chromatography.
13.	Discuss the methodology involved in adsorption column chromatography.

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Section- A (10X2=20)

1.	Give very short answers to the followings:
i.	Why is glass not used for UV spectroscopy?
ii.	Define auxochromes.
iii.	Define bending vibration in IR spectroscopy.
iv.	What is quenching?
v.	Define Rf value.
vi.	What is gradient chromatography?
vii.	What is the role of gas in gas chromatography?
viii.	Mention the detectors of IR radiation.
ix.	Give any two examples of fluorescent sources.
x.	Write any two applications of affinity chromatography.

Section- B (2X10=20)

2.	Describe the theory of fluorescence spectroscopy and the factors influencing it.
3.	What are the factors affecting IR vibrations? Describe the different types of IR vibrational modes.
4.	Summarize the principle and basic instrumentation of High-Performance Liquid Chromatography (HPLC).

Section- C (7X5=35)

5.	Write a note on interferences in flame emission spectroscopy.
6.	Briefly explain the principle of UV spectroscopy.
7.	Write a note on ion-exchange chromatography.
8.	Briefly explain the principle of affinity chromatography.
9.	Write a short note on Thin Layer Chromatography (TLC).
10.	Explain the detectors used in Gas Chromatography (GC).
11.	Write a note on gel chromatography.
12.	Briefly explain the principle of capillary electrophoresis.
13.	Write a note on the principle and applications of Atomic Absorption Spectroscopy (AAS).

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Section- A (10X2=20)

1.	Give very short answers to the followings:
i.	What do you mean by isobestic point?
ii.	Define quenching.
iii.	What is the range for finger print region in IR spectroscopy?
iv.	Give principle of AAS.
v.	What is the stationary phase used in electrophoresis?
vi.	Enumerate advantages of TLC.
vii.	Write down Van Deemter equation.
viii.	Define resolution in HPLC chromatogram.
ix.	What is the role of buffer system in ion exchange chromatography?
x.	Give significance of affinity chromatography.

Section- B (2X10=20)

2.	Write down short note on the pump system and detectors used in HPLC system.
3.	Classify different types of paper chromatography.
4.	Explain sampling techniques used in IR spectroscopy.

Section- C (7X5=35)

5.	Differentiate between chromophore and auxochrome.
6.	Give a short note on PDA detector.
7.	Write a brief note on interferences present in flame photometry.
8.	What is the principle of partition column chromatography?
9.	What are the factors affecting electrophoretic mobility?
10.	What do you mean by FID?
11.	Give diagrammatic representation of GC system.
12.	Explain applications of gel chromatography in brief.
13.	Define cationic resins. Give two examples of the same.

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