

2023

Time : 3 hours

Full Marks : 60

*Candidates are required to give their answers
in their own words as far as practicable.*

The figures in the margin indicate full marks.

Answer any five questions in

which question no 1 is compulsory.

1. Choose the correct answer : $1 \times 12 = 12$

(a) Electromagnetic radiation is
characterised by :

- (i) Amplitude
- (ii) Wavelength

(iii) Frequency

(iv) All

(b) The wave length of absorption is 250 nm.
In which part of electromagnetic
spectrum does it lie?

(i) Infrared

(ii) Ultraviolet ✓

(iii) Microwave

(iv) Radiowave

(c) Which of the following have lowest wave
length?

(i) Ultraviolet ✓

(ii) Infrared

(iii) X-ray

(iv) Visible

(d) Radiation of wavelength 200 nm is
equivalent in wavenumber is :

(i) $5 \times 10^4 \text{ cm}^{-1}$

(ii) $5 \times 10^5 \text{ cm}^{-1}$

(iii) $5 \times 10^2 \text{ cm}^{-1}$

(iv) $5 \times 10^8 \text{ cm}^{-1}$

(e) Which of the following relation is correct?

(i) $\nu = \frac{c}{\lambda}$

(ii) $\nu = c\lambda$

(iii) $\nu = \frac{\lambda}{c}$

(iv) All

(f) The C=C stretching frequency for olefins shows absorption at the range nearly :

(i) $1680-1600 \text{ cm}^{-1}$

(ii) $3300-3200 \text{ cm}^{-1}$

(iii) $3100-3000 \text{ cm}^{-1}$

(iv) $900-700 \text{ cm}^{-1}$

(g) The C-H stretching frequency for aromatic hydrocarbons shows absorption at the range nearly :

(i) $1650-1600 \text{ cm}^{-1}$

(ii) $3100-3000 \text{ cm}^{-1}$

(iii) $1150-1000 \text{ cm}^{-1}$

(iv) $900-700 \text{ cm}^{-1}$

(h) In chromatography, which of the following can the mobile phase be made of ?

(i) Gas only

(ii) Liquid and gas

(iii) Liquid only

(iv) Solid and liquid

(i) Electronic excitations occurs in the range of :

- (i) 200-780 nm
 (ii) 220-500 nm
 ✓(iii) 250 - 700 nm
 (iv) 290-1000 nm
- (j) The hottest flame in O_2 is produced by :
 ✓(i) Acetylene
 (ii) Cyanogen
 (iii) Butane
 (iv) Hydrogen
- (k) In thermogravimetry analysis the result obtained as a : <https://www.jharkhandstudy.com>
 ✓(i) Continuous chart
 (ii) Discontinuous chart
 (iii) Continuous parabola
 (iv) Discontinuous parabola
- (l) Solvent extraction is a _____ analytical technique.

- (i) Separation
 (ii) Qualitative
 (iii) Quantitative
 (iv) Identification
2. What is IR spectroscopy? Explain the different components of Instrument of IR spectrophotometer. 4+8=12
3. What is flame emission spectroscopy? Explain the different components of instrumentation of flame emission spectrophotometer. 4+8=12
4. What is chromatography ? Discuss the different types of chromatography. 4+8=12
5. (a) Write the wavelength of different electromagnetic radiation. 6
 (b) Explain the Lambert-Beer's law. 6
6. What is potentiometric titration? Discuss the acid-base potentiometric titration. 4+8=12

7. Write the theory of thermogravimetry analysis (TGA). Explain its instrumentation.

4+8=12

8. Explain the solvent extraction method. How does organic species extract from aqueous and non-aqueous solution.

6+6=12

9. Write down short notes on any two of the following :

6×2=12

(a) Monochromator of UV-visible spectrophotometer

(b) Different fundamental absorption band of IR spectra

(c) Flame of flame photometer

(d) Interaction of electromagnetic radiation with matter

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(7)

(P-500)