

[ 4 ]

5. (a) Deduce the energy levels of trimethylenemethane using HMO theory. 2
- (b) With the help of Walsh diagram of pyramidal  $\text{CH}_3$ , draw the molecular orbitals of ethane. 3
- (c) Predict the major product formed in the following reaction. 2



- (d) What is TASSO?  $\text{CH}_4$  is not square planar rather than tetrahedral – explain. Give one example of tetracoordinated planar carbon molecule.  $\frac{1}{2}+2+\frac{1}{2}$

Ex/SC/CHEM/PG/CORE/TH/X-AO-2/2023

**MASTER OF SCIENCE CHEMISTRY EXAMINATION, 2023**

(3rd Semester, CBCS)

**PAPER: X-AO-2**

[ ANALYTICAL CHEMISTRY (A2) + ORGANIC CHEMISTRY (O2) ]

Time : Two Hours

Full Marks : 40

(20 marks for each unit)

Use a separate answer script for each unit.

**310-A-2a & 310-A-2b**

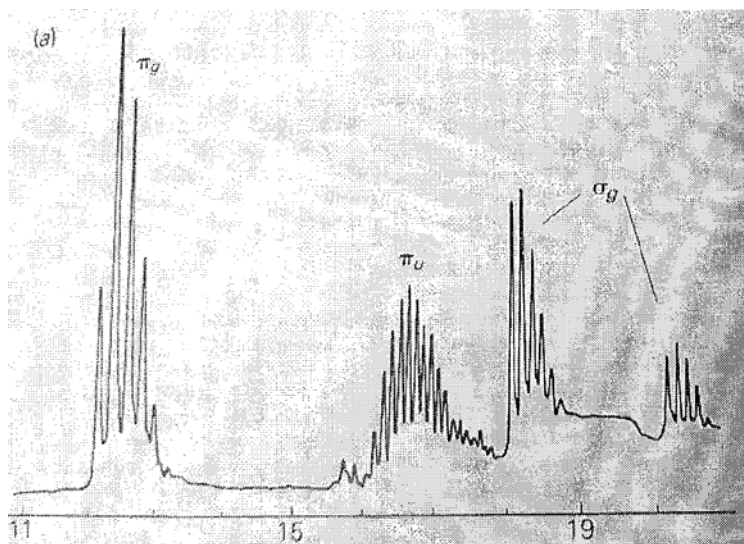
Answer *Q.no. 1* and either *Q.no. 3*.

1. (a) Outline the principle of Electron Probe Micro Analysis (EPMA). Write down some applications of this probe. 2+1
- (b) What are the specific advantages of Laser Microprobe Mass Spectrometry (LAMMS)? Outline some applications of LAMMS. 1+2
- (c) Mention the advantage of FAB. Name a liquid matrix used in FAB. 1+1
- (d) What do you mean by Field Desorption (FD)? 2
2. (a) Why the photoelectron spectrum of methane does not match with the VB representation of methane? 3
- (b) What is ESCA? Explain its use. 3

[ Turn over

[ 2 ]

- (c) What is the principle of photoelectron spectroscopy?  
How many types of photoelectron spectroscopy are there? Explain 4
3. (a) What is ESCA? How is it used in the analysis of solid samples? 1+2
- (b) Draw a diagram of UV photoelectron spectrometer indicating the various parts of it and explain their functions. 1+3
- (c) Given below is the UV photoelectron spectra of O<sub>2</sub>.

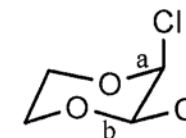


Taking help of MO diagram explain why loss of an electron from  $2\sigma_g$  level gives rise to a pair of bands. 3

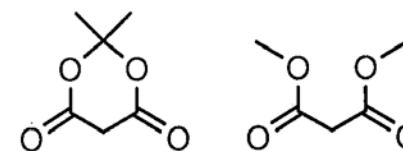
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UNIT - 310 - O -2

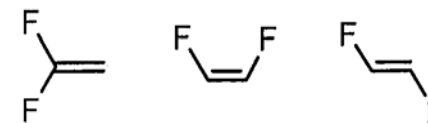
4. Answer the following questions from MO viewpoint. 2x5
- (a) Compare the “a” and “b” bond lengths of the following molecule.



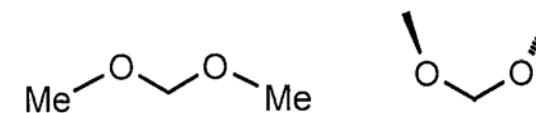
- (b) Which one of the following compounds is most acidic?



- (c) Arrange the stability order of the following configurations of difluoroethene?



- (d) Draw the HOMO and LUMO of 1,3,5-hexatriene with proper lobe coefficients.
- (e) Which one of the following conformations of dimethoxymethane is most stable?



[ Turn over