

**DEPARTMENT OF CHEMISTRY**

<b>Course Code:</b> 33CT11	<b>Programme:</b>	<b>M.Sc.,</b>	<b>CIA: II Test</b>
<b>Date:</b> 10.10.2019	<b>Major:</b>	<b>CHEMISTRY</b>	<b>Semester: I</b>
<b>Time:</b> 2Hrs	<b>Year:</b>	<b>I</b>	<b>Maximum: 50 Marks</b>
<b>Course Title:</b>	<b>ORGANIC CHEMISTRY-I</b>		

**SECTION – A**

**Answer ALL questions**

**(5 x 1 = 5)**

1.  $\text{RCOO}^- + \text{BrCN}^* \rightarrow \text{RCN}^*$

(CO1)

The reaction follows

a) Isotopic labeling

b) detection of intermediate

c) Isolation of an intermediate

d) Trapping of intermediate

2. A nitrene can be trapped by

(CO2)

a) CO

b)  $\text{CO}_2$

c)  $\text{SO}_2$

d)  $\text{SO}_3$

3. Choose the wrong statement from the following

(CO3)

a) naphthalene is alternant hydrocarbon

b) azulene is non-alternant hydrocarbon

c) for non-alternant hydrocarbons, the energies of the bonding and anti-bonding orbitals are equal and opposite

d) syndnones are aromatic in nature

4. Which of the following compound contains diastereotopic protons?

(CO4)

a) ethyl chloride

b) 1,2-dichloropropane

c) 2-methylpropene

d) 1,2-dichloroethane

5. How many sugar residues are present in  $\alpha$ -cyclodextrin

(CO5)

a) 4

(b) 8

(c) 6

d) 7

**SECTION – B**

**Answer any FIVE questions**

**(5 x 2 = 10)**

6. Define field effect?

(CO1)

7. Give any two application of inductive effect

(CO1)

8. What are triplet carbenes

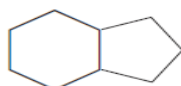
(CO2)

9. Discuss the aromaticity of syndnones.

(CO3)

10. Write the IUPAC name for following compounds.

(CO3)



11. Define enantiomeric excess.

(CO4)

12. What is meant by Mutarotation?

(CO5)

**SECTION – C**

**Answer any THREE questions**

**(3 x 5 = 15)**

13. Write short notes on types of Intermediate with example?

(CO2)

14. List out the kinetic and non-kinetic methods for determination of reaction mechanism?

(CO2)

15. Discuss the chemistry of adamantane.

(CO3)

16. Discuss asymmetric synthesis using chiral auxiliary.

(CO4)

17. Explain in detail about the furanose structure of Glucose

(CO5)

**SECTION – D**

**Answer any TWO questions**

**(2 x 10 = 20)**

18. Explain in detail about resonance and its applications?

(CO1)

19. (i) Interpret the optical activity of allenes, biphenyls and spiranes.

(CO4)

(ii) Illustrate stereospecific and stereoselective reactions with suitable examples.

20. Elucidate the skeletal structure of Quinine.

(CO5)

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**VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234****DEPARTMENT OF CHEMISTRY**

<b>Course Code:</b> 33CT12	<b>Programme:</b>	<b>M.Sc.,</b>	<b>CIA:</b> II Test
<b>Date:</b> 11.10.2019	<b>Major:</b>	<b>CHEMISTRY</b>	<b>Semester:</b> I
<b>Time:</b> 2Hrs	<b>Year:</b>	<b>I</b>	<b>Maximum:</b> 50 Marks
<b>Course Title:</b>	<b>INORGANIC CHEMISTRY-I</b>		

**SECTION – A****Answer ALL questions****(5 x 1 = 5)**

1. The factors favoring the formation of ionic bond are (CO1)
  - (a) High ionization energy and high electron affinity
  - (b) low ionization energy and low electron affinity
  - (c) high ionization energy and low electron affinity
  - (d) low ionization energy and high electron affinity
2. Which statement is incorrect about a cubic close-packed lattice? (CO1)
  - (a) All atoms have a coordination number of 12
  - (b) The lattice contains both tetrahedral and octahedral holes
  - (c) Layers of close-packed atoms are stacked in an ABABAB... pattern
  - (d) The packing is more efficient than in a body-centered cubic lattice
3. Anti-bonding molecular orbitals are produced by (CO2)
  - (a) Constructive interaction of atomic orbitals
  - (b) Destructive interaction of atomic orbitals
  - (c) The overlap of the atomic orbitals of two negative ions
  - (d) All of these
4. According to valence bond theory, a bond between two atoms is formed when (CO2)
  - a) Half-filled atomic orbitals overlap      b) Fully filled atomic orbitals overlap
  - c) Non-bonding atomic orbitals overlap      d) Electrons of the two atoms overlap
5. MoO<sub>6</sub> and WO<sub>6</sub> groups are (CO4)
  - (a) Heteropolyacids      (b) Isopolyacids      (c) polyacids      (d) acids

## SECTION – B

**Answer any FIVE questions**

**(5 x 2 = 10)**

6. Write down the factors that affect the lattice energy (CO1)
7. What is Slater rule and mention the uses with example (CO1)
8. Derive Pauling's equation to calculate the ionic radius of a compound (CO1)
9. Illustrate any three limitations of VB theory (CO2)
10. What is meant by Bent's rule? (CO2)
11. Comment on the relationship between bond order, bond length and bond strength (CO2)
12. Give an alternative name for each of the following groups of silicates (CO4)
  - (a) Nesosilicates
  - (b) Double island silicates
  - (c) Cyclo-silicates and
  - (d) Sheet silicates.

## SECTION – C

**Answer any THREE questions**

**(3 x 5 = 15)**

13. Account on Fajan's rule and its applications (CO1)
14. Write a note on relation between radius ratio (CO1)
15. List out the postulates and limitations of VSEPR theory (CO2)
16. Draw the MO diagram of N<sub>2</sub> and CO molecules (CO2)
17. Write a note on preparation and properties of S<sub>4</sub>N<sub>4</sub> (CO4)

## SECTION – D

**Answer any TWO questions**

**(2 x 10= 20)**

18. What is lattice energy? How will you obtain lattice energy from
  - (a) Born-Habercycle
  - (b) Born-Lande equation(CO1)
19. What are carbides? Discuss any two types of carbides in detail (CO4)
20. i) Identify the hybridization and geometry of the following molecules. (3) (CO2)
  - a) PF<sub>5</sub>
  - b) ClF<sub>3</sub>
  - c) SO<sub>4</sub><sup>2-</sup>ii) Draw the Lewis dot structure for the following molecules. (3)
  - a) SF<sub>6</sub>
  - b) XeF<sub>4</sub>
  - c) XeO<sub>2</sub>F<sub>2</sub>iii) Explain inter and intramolecular hydrogen bonding with examples. (4)

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**DEPARTMENT OF CHEMISTRY**

<b>Course Code:</b> 33CT13	<b>Programme:</b>	<b>M.Sc.,</b>	<b>CIA: II Test</b>
<b>Date:</b> 12.10.2019	<b>Major:</b>	<b>CHEMISTRY</b>	<b>Semester: I</b>
<b>Time:</b> 2Hrs	<b>Year:</b>	<b>I</b>	<b>Maximum: 50 Marks</b>
<b>Course Title:</b>	<b>PHYSICAL CHEMISTRY-I</b>		

**SECTION – A**

**Answer ALL questions**

**(5 x 1 = 5)**

- Sin x is an Eigen function of operator. (CO 1)  
 a) A                      b) G                      c)  $d^2/dx^2$                       d) Cos
- The energy of a 3-D box is  $27h^2/8ma^2$ . The degree of degeneracy is. (CO 2)  
 a) 1                      b) 2                      c) 3                      d) 4
- Which one is not Gibb's Duhem equation? (CO 3)  
 a)  $n_i d\mu_i = 0$                       b)  $\sum n_i d\mu_i = 0$                       c)  $dG = \sum \mu_i dn_i$                       d)  $\sum x_i d\mu_i = 0$
- In Langmuir adsorption isotherm, at high pressure, the order of the reaction is (CO 4)  
 a) One                      b) Zero                      c) Two                      d)  $[A]^{-1}$
- The total pressure of a mixture of gases is equal to the sum of the partial pressures of all the gases present (CO 5)  
 a) Graham's law                      b) Avogadro's law                      c) Dalton's law                      d) none of these

**SECTION – B**

**Answer any FIVE questions**

**(5 x 2 = 10)**

- State the photoelectric effect. (CO 1)
- What do you mean by tunneling effect? (CO 2)
- Define Zeropoint energy. (CO 2)
- Write the formula of three different velocities and how are they related to each other? (CO 5)
- What is Steady state approximation and its uses? (CO 4)
- Define kinetic isotopic effect. (CO 4)
- What do you mean by non-equilibrium thermodynamics? (CO 3)

**SECTION – C**

**Answer any THREE questions**

**(3 x 5 = 15)**

- Derive the expression for Hermitian operator. (CO 1)
- Derive an expression for the energy of a rigid rotator using the Schrodinger wave equation. (CO 2)
- Briefly explain Equipartition principle. (CO 5)
- Write a note on RRKM and slater treatment. (CO 4)
- How can you determine experimentally the activity and activity coefficients? (CO 3)

**SECTION – D**

**Answer any TWO questions**

**(2x 10 = 20)**

- a) Apply that for a particle in a 1-D box. (CO 2)  
 b) Set up the SWE for SHO and solve it for the energy eigen values.
- Elaborate the theory of liquid crystals with applications. (CO 5)
- (a) Discuss the Lindeman theory of unimolecular reactions (CO 4)  
 (b) Write a note on salt effect.

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**VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234****DEPARTMENT OF CHEMISTRY**

<b>Course Code:</b> 33CT31	<b>Programme:</b> M.Sc.,	<b>CIA:</b> III Test
<b>Date:</b> 12.10.2019	<b>Major:</b> CHEMISTRY	<b>Semester:</b> III
<b>Time:</b> 2Hrs	<b>Year:</b> II	<b>Maximum:</b> 50 Marks
<b>Course Title:</b>	<b>ORGANIC CHEMISTRY – III</b>	

**SECTION – A****Answer ALL questions****(5 x 1 = 5)**

- Which of the following bonds would be expected to have the lowest frequency stretch? (CO1)  
(a) C-Cl                      (b) C-Br                      (c) C-I                      (d) C-F
- The  $^{13}\text{C}$  NMR spectrum of a compound A contains two signals and in the  $^1\text{H}$  NMR spectrum there is a singlet. Which compound is consistent with these data? (CO2)  
(a) acetone                      (b) dichloromethane                      (c) ethanol                      (d) bromoethane
- Which of the following statements is **INCORRECT** regarding mass spectrometry? (CO3)  
a) It gives information about fragmentation patterns  
b) Isotopic distribution patterns are observed in mass spectra  
c) It provides direct structural data  
d) It is a destructive technique
- Pericyclic reactions follow .....mechanism. (CO4)  
a) polar                      b) free radical                      c) cationic                      d) concerted
- The photochemical isomerization of 4,4-diphenyl cyclohexadienone gives a ketone and phenols. This reaction is known as..... (CO5)  
a) Barton reaction    b) Zimmerman rearrangement    c) Norrish type II    d) Paterno-Buchi

**SECTION – B****Answer any FIVE questions****(5 x 2 = 10)**

- How will you identify chlorobenzene by IR and NMR data? (CO1)
- Write a difference between  $^1\text{H}$ -NMR and  $^{13}\text{C}$ -NMR. (CO2)
- What do you mean by metastable peak? (CO3)
- Define base peak. (CO3)
- Write down the selection rules for cycloadditions. (CO4)
- What are photosensitizers? (CO5)
- Write one example for photooxidation reaction. (CO5)

**SECTION – C****Answer any THREE questions****(3 x 5 = 15)**

- Rationalize the ring strain and an electronic effect varies the IR frequencies. Give an example. (CO1)
- Illustrate the principle and applications of NOE in determining the conformation of molecule. (CO2)

15. Write a note on: a) Nitrogen rule b) McLafferty rearrangement (CO3)
16. Verify the selection rules for  $4n\pi$  &  $4n+2\pi$  e<sup>-</sup>s system in [1,5] Sigmatropic rearrangements under thermal and photochemical conditions. (CO4)
17. Write a note on: i) Di-pi methane rearrangement ii) Barton reaction (CO5)

### SECTION – D

**Answer any TWO questions**

**(2 x 10 = 20)**

18. Take any two organic molecules and explain how UV, IR and NMR is useful in elucidate the structure of that molecules. (CO1)

19. An unknown compound exhibits the following spectra data. (CO3)

IR:  $1685\text{ cm}^{-1}$

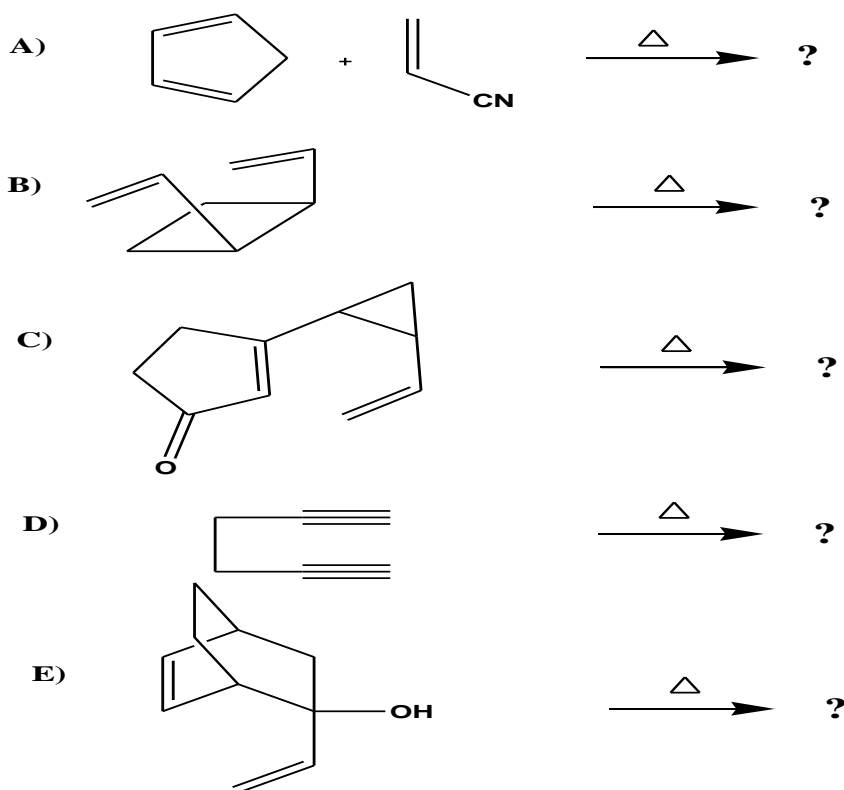
$^1\text{H}$  NMR (ppm):  $\delta$  7.84 (d,  $J=8\text{ Hz}$ , 2H),  $\delta$  7.6 (d,  $J=8\text{ Hz}$ , 2H),  $\delta$  3.65 (t,  $J=7\text{ Hz}$ , 2H),  $\delta$  3.18 (t,  $J=7\text{ Hz}$ , 2H),  $\delta$  2.25 (pentet,  $J=7\text{ Hz}$ , 2H)

$^{13}\text{C}$  NMR (ppm):  $\delta$  28, 36, 45, 128, 130, 133, 137, 197

EI MS ( $m/z$ ): 200, 198 (1:1), 185, 183 (1:1)

Identify the structure of the compound.

20. Find out the major product in the following reactions. (CO4)



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**VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234****DEPARTMENT OF CHEMISTRY**

<b>Course Code:</b> 33CT32	<b>Programme:</b> M.Sc.,	<b>CIA:</b> III Test
<b>Date:</b> 10.10.2019	<b>Major:</b> CHEMISTRY	<b>Semester:</b> III
<b>Time:</b> 2Hrs	<b>Year:</b> II	<b>Maximum:</b> 50 Marks
<b>Course Title:</b>	<b>INORGANIC CHEMISTRY – III</b>	

**SECTION – A****Answer ALL questions****(5 x 1 = 5)**

- The cluster having arachno structure is (CO1)  
 (a)  $[\text{Os}_5(\text{CO})_{16}]$  (b)  $[\text{Os}_3(\text{CO})_{12}]$  (c)  $[\text{Ir}_4(\text{CO})_{12}]$  (d)  $[\text{Rh}_6(\text{CO})_{16}]$
- The final product in the reaction of  $[\text{Cr}(\text{CO})_6]$  and  $\text{CH}_3\text{CN}$  is (CO2)  
 (a)  $\text{Cr}(\text{CO})_4(\text{CH}_3\text{CN})_2$  (b)  $\text{Cr}(\text{CO})_3(\text{CH}_3\text{CN})_3$   
 (c)  $\text{Cr}(\text{CH}_3\text{CN})_6$  (d)  $\text{Cr}(\text{CO})_3(\text{CH}_3\text{CN})_2$
- Ionic mechanism followed in the ----- reaction. (CO3)  
 (a) Oxidative addition (b) free radical substitution  
 (c) free radical addition (d) migratory insertion
- The sandwich complex  $\eta\text{-CpCoC}_n\text{H}_n$  is an 18 electron species when 'n' is (CO4)  
 (a) 6 (b) 4 (c) 3 (d) 5
- The catalyst used for polymerization of olefins is generated from: (CO5)  
 (a)  $\text{Ru}(\text{PPh}_3)_3\text{Cl}$  (b)  $\text{TiCl}_4$  and  $\text{AlEt}_3$   
 (c)  $\text{PdCl}_2$  and  $\text{CuCl}$  (d)  $\text{CO}_2(\text{CO})_9$  and Na

**SECTION – B****Answer any FIVE questions****(5 x 2 = 10)**

- What do you mean by hapticity? (CO1)
- Define 18 electron and 16 electron rule. (CO2)
- What is meant by half sandwich and bent sandwich? (CO4)
- What are difference between Fischer carbyne singlet and Schrock carbyne complex? (CO4)
- What is meant by Davies –Green-Mingos rule? (CO4)
- Define water gas reaction. (CO5)
- Why are the basic difference between Stille coupling and Suzuki coupling reaction? (CO5)

**SECTION – C****Answer any THREE questions****(3 x 5 = 15)**

- How are organometallic compounds classified? (CO1)
- Discuss the preparation and structure of sodium nitroprusside. (CO2)
- How will you synthesis metal alkene complex? Give its properties? (CO4)
- Draw and explain the bonding nature in metal alkyne complex. (CO4)
- Illustrate mechanism of Miyaura Suzuki coupling reaction. (CO5)

**SECTION – D****Answer any TWO questions****(2 x 10 = 20)**

- Interpret the concept of isolobal analogy with suitable examples. (CO1)
- Illustrate the nature bonding of metal nitrosyl complexes. (CO2)
- Explain in detail about synthesis and chemical properties of metal allyl and butadiene complex. (CO4)

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**VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234****DEPARTMENT OF CHEMISTRY**

<b>Course Code:</b> 33CT33	<b>Programme:</b> M.Sc.,	<b>CIA:</b> III Test
<b>Date:</b> 11.10.2019	<b>Major:</b> CHEMISTRY	<b>Semester:</b> III
<b>Time:</b> 2Hrs	<b>Year:</b> II	<b>Maximum:</b> 50 Marks
<b>Course Title:</b>	<b>PHYSICAL CHEMISTRY – III</b>	

**SECTION - A****Answer ALL the questions****(5 x 1 = 5)**

- The point group  $D_{2h}$  does not contain  
a) two-fold axis   b) horizontal plane   c) vertical plane   d)  $S_4$  axis **(CO1)**
- The symmetry number is 6 for **(CO2)**  
a)  $BF_3$    b)  $XeF_4$    c)  $CO_2$    d)  $SF_6$
- Which of the following molecule shows ESR spectra? **(CO4)**  
a)  $H_2O$    b)  $O_2$    c)  $H_2O_2$    d)  $CO_2$
- Mossbauer Spectroscopy involves nuclear transitions resulting from the absorption of ---- rays. **(CO4)**  
a) alpha   b) beta   c) gamma   d) all the above
- The reciprocal of viscosity is called **(CO5)**  
a) Surface tension   b) Fractional resistance   c) Fluidity   d) Surface area

**SECTION – B****Answer any FIVE questions****(5 x 2 = 10)**

- Verify that the characters given in the  $C_{2v}$  point group obey the properties of the irreps. **(CO1)**
- What do you mean by SALC **(CO2)**
- Write the difference between IR and Raman Spectroscopy. **(CO2)**
- What is the basic principle of Mossbauer spectroscopy? **(CO4)**
- Write any two applications of ESR spectroscopy. **(CO4)**
- What is significance of viscosity in the biological system? **(CO5)**
- What is surface tension in alveoli? **(CO5)**

**SECTION – C****Answer any THREE questions****(3 x 5 = 15)**

- State and explain GOT **(CO1)**
- Construction the character table for  $C_{2v}$ . **(CO1)**
- Apply group theory to solve  $sp^3$  hybridization molecule with example. **(CO2)**
- Explain: a) Doppler Effect   b) Mossbauer effect. **(CO4)**
- Explain in brief the applications of NQR spectroscopy. **(CO4)**

**SECTION – D****Answer any TWO questions****(2 x 10 = 20)**

- Explain in detail the HMO's for ethylene molecule. **(CO2)**
- Establish the symmetry species of the normal modes vibration of ammonia molecule. **(CO2)**
- Define 'g' value. What are the factors affecting it? Explain hyperfine splitting in ESR. **(CO4)**

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**VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234****DEPARTMENT OF CHEMISTRY**

<b>Course Code:</b> 33EP1A	<b>Programme:</b> M.Sc.,	<b>CIA:</b> II Test
<b>Date:</b> 14.10.2019	<b>Major:</b> CHEMISTRY	<b>Semester:</b> I
<b>Time:</b> 2Hrs	<b>Year:</b> I	<b>Maximum:</b> 50 Marks
<b>Course Title:</b>	<b>COMPUTER APPLICATIONS IN CHEMISTRY</b>	

**SECTION – A****Answer ALL questions****(5 x 1 = 5)**

- The direction of a rectangular page for viewing and printing is called  
a) Orientation b) Direction c) Print Layout d) Preview CO1
- DNS stands for  
a) Domain Null System b) Disk Name System  
c) Domain Number System d) Domain Name System CO2
- Which operator has the lowest priority?  
a) ++ b) % c) + d) || CO3
- In an array each value is called as  
a) Element b) Variable c) Dimension d) None of the above CO4
- The usage of Lasso tool in Chemdraw is to...  
a) Select b) Rotate c) Deselect d) Make a bond CO5

**SECTION – B****Answer any FIVE questions****(5 x 2 = 10)**

- Give two significance of Chemdraw. CO1
- What is the working way of internet? CO2
- Expand a) URLS b) PDF CO2
- Define array and declaration CO3
- List out the different types of functions. CO3
- What is meant by regrusion? CO4
- Define structure display. CO5

**SECTION – C****Answer any THREE questions****(3 x 5 = 15)**

- What are the salient features of windows and MS word for typing texts and equations. CO1
- Briefly explain the literature survey websites in chemistry. CO2
- Explain the functions. CO3
- Discuss about the reading and writing character. CO3
- How to NMR stimulate and interpret using ChemDraw software? CO5

**SECTION – D****Answer any TWO question****(2 x 10 = 20)**

- How will you create and access databases using MS access. CO2
- Explain about the array and its two dimensional array with example. CO3
- (a) How to get chemical structure from name and name from structure using chemdraw?  
(b) What is difference between chemdraw and chem 3D? (6 +4 mark) CO5

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**VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234**

<b>Course Code:</b> 33NE3A	<b>Programme:</b> M.Sc., / M.COM	<b>CIA:</b> III Test
<b>Date:</b> 14.10.2019	<b>Major:</b> ZOOLOGY / M.COM	<b>Semester:</b> III
<b>Time:</b> 2Hrs	<b>Year:</b> II	<b>Maximum:</b> 50 Marks
<b>Course Title:</b>	<b>FORENSIC CHEMISTRY</b>	

**SECTION – A****Answer ALL questions****(5 x 1 = 5)**

Identification of explosives and examination of their operation is done by \_\_\_\_\_ division of CFSL-CBI? **(CO1)**

- (a) physics (b) chemistry (c) serology (d) ballistics

1. Brain Mapping is also known as **(CO2)**

- (a) P3 (b) P2 (c) P1 (d) P0

2. The pattern of interaction, which is function of wavelength, is sometime called a \_\_\_\_ **(CO3)**

- (a) Physical fingerprint (b) chemical fingerprint (c) fingerprint (d) FTIR

3. Density is the ratio of \_\_\_\_\_

- (a) mass\* volume (b) mass/volume (c) mass + volume (d) mass - volume **(CO4)**

4. Which technique is used to document the skeletal characteristics of an unidentified body?

- (a) MRI (b) CT (c) Radiograph (d) X ray **(CO5)**

**SECTION – B****Answer any FIVE questions****(2 x 5 = 10)**

6. Define Forensic Pathology **(CO1)**

7. Mention the types of finger print **(CO2)**

8. What is the purpose of a comparative analysis? **(CO3)**

9. Define the term Physical match. **(CO3)**

10. Define microcrystalline test. **(CO3)**

11. What are the appearances of the product when iodine vapors are absorbed by fingerprint residue? **(CO3)**

12. Write any three physical characteristics done in Autopsy. **(CO5)**

**SECTION – C****Answer any THREE questions****(3 x 5 = 15)**

13. Briefly explain the fingerprint division of CFSL **(CO1)**

14. Mention briefly about the surface characteristics and collection methods in finger print. **(CO2)**

15. Discuss the following terms:

- (a) comparative analysis (b) Classification and (c) Individualization **(CO3)**

16. Discuss the difference between latent, negative, and plastic fingerprints. **(CO3)**

17. Write down the important criteria followed in fire arm injuries in autopsy. **(CO5)**

**SECTION – D****Answer any TWO questions****(2 x 10 = 20)**

18. Elaborate the functioning of the following departments in crime identification:

- a) Lie detection division b) Photography division c) Scientific aids division **(CO1)**

19. Explain briefly about the critical analysis of brain mapping. **(CO2)**

20. (a) Discuss how fingerprint powder can be used to develop latent fingerprints.

- (b) Briefly discuss the two types of presumptive drug tests. **(CO3)**

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