M.Sc (Part II) By Rese... Microbiology paper VIII To... and Techniques in Microbiology

VT-F.H.Exam. Mar.-13-72

Con. 1498-13.

By Paper] (3 Hours) **[Total Mar...**

By Research] (3 Hours) **[Total Marks : 1...**

30 April 20...

N.B. : (1) **All** questions are **compulsory**.
(2) **For Paper** each question carries **15** marks.
(3) **For Research** each question carries **20** marks.

1. (a) Answer any **one** of the following :– **7/10**
   (i) Describe screening of a genomic library by DNA hybridization.
   (ii) Write a note on applications of improved phage λ vectors in recombinant DNA technology.
   (b) Answer any **one** of the following :– **8/10**
   (i) Give an account of basic troubleshooting in running 2-D gels.
   (ii) Give an outline protocol for SADE.

2. (a) Describe any **one** of the following :– **7/10**
   (i) Techniques and principles of ICC-PCR, Multiplex PCR and seminested PCR.
   (ii) Phylogenetic studies based on FISH.
   (b) Answer any **one** of the following :– **8/10**
   (i) Describe a molecular approach to study the diversity of microbial communities.
   (ii) Describe the principle, procedure and applications of RFLP technique.

3. (a) Answer any **one** of the following :– **7/10**
   (i) Describe the features of completely randomized and factorial experiments.
   (ii) Discuss the laws relating to sampling and studies on wild life.
   (b) Describe any **one** of the following :– **8/10**
   (i) Various types of investigations in research.
   (ii) The strengths and weaknesses of an experimental design.

4. (a) Answer any **one** of the following :– **7/10**
   (i) Describe the problems faced in processing the research data.
   (ii) Discuss phylogenetic analysis using bioinformatic tools.
   (b) Describe any **one** of the following :– **8/10**
   (i) The methods used for illustration of quantitative data.
   (ii) The elements involved in the secondary structure of proteins.

5. (a) Write short notes on any **three** of the following :– **12/15**
   (i) Edman protein microsequencing.
   (ii) The need for sampling in research.
   (iii) Software for data analysis for cloned concatamers.
   (iv) Computational challenges in structure and function prediction of biomolecules.
   (b) Answer any **one** of the following :– **3/5**
   (i) Describe the use of nucleases in genetic engineering.
   (ii) Explain the term "Observer bias".

M.Sc B4. Research (
Microbiology paper II Microb
Genetics

35 : 1st half.13-shilpa(h)

Con. 5990-13. PB-

By Paper] [Total Marks : 75

(3 Hours)

By Research] [Total Marks : 100

22 April 2013

N.B. : (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks assigned to the question.

1. Write an essay on any **one** of the following :– **15/16**
   (a) Mechanism of transposition
   (b) DNA replication and its regulation in procaryotes.

2. Answer any **three** of the following :– **15/21**
   (a) Discuss the strategy for sequencing of whole genome libraries.
   (b) Explain molecular basis of transduction.
   (c) Discuss replication and maturation of Mu phages.
   (d) Explain techniques of gene mapping not using concept of gene transfer.

3. Answer any **three** of the following :– **15/21**
   (a) Explain mechanism of plasmid replication.
   (b) Discuss mechanism of suppression of nonsense mutations.
   (c) Discuss the mechanism by which lambda phage represses induction during lysogeny.
   (d) How does cellular differentiation occur in higher eucaryotes.

4. Answer any **three** of the following :– **15/21**
   (a) Discuss excision - repair systems in *E.coli*.
   (b) How is the technique of hybridisation used to identify specific clones in a DNA library ?
   (c) Enlist the principle classes of transposable elements and discuss any one in detail.
   (d) Enlist types of restriction system, discuss in detail the one that finds application in genetic engineering.

5. Attempt any **three** of the following :– **15/21**
   (a) Discuss Knudson's two-hit mutation model to explain occurence of Cancer.
   (b) Write a short note on Tumor-suppressor genes.
   (c) Give significance of functional genomics.
   (d) What is BLAST ? How is this tool used in bioinformatics ?

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M.Sc. By Research (Theory) Chemistry : Paper II : Analytical

Con. 1450–13. PB

(3 Hours) [Total Marks : 100

29th April 2013

N.B. (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.
(3) Use of **logarithmic table/non programmable** calculator is **allowed**.

1. Attempt any **five** of the following :— **20**
   (a) Describe the working of a dual wavelength spectrophotometer, with the help of a block diagram. What types of samples can be analysed by it ?
   (b) Why is ICP-AES a superior technique as compared to AAS for multielement analysis ?
   (c) Draw a labelled block diagram of FTNMR. With respect to FTNMR explain sample spinning.
   (d) What are the advantages and limitations of electron impact source used in mass spectrometry ?
   (e) Discuss in brief any one of the variables that affect column performance.
   (f) Ethanol and methanol are separated on a capillary gas chromatography column with retention times of 360s and 440s and base width of 14·1s and 16·2s. An unretained peak occurs at 10·0s. Calculate the selectivity factor and the resolution.
   (g) What is the effect of instrumental factors on DTA curve.
   (h) Discuss the nature of thermometric titration curve for the titration of a solution containing calcium ions and magnesium ions against EDTA.

2. (a) What are the different types of molecular transitions encountered in UV-visible spectroscopy ? Explain the effect of nature of solvent on electronic transition. **7**

OR

(a) Describe the working of a diode array detector. What are its advantages in photometric analysis ? **7**

(b) Molar absorptivity of a coloured complexes of metal '**X**' and '**Y**' are as follows :— **6**

Metals	Molar absorptivity	E mole^{-1} cm^{-1} dm^3
	500 nm	390 nm
X	9425	650
Y	545	8375

The absorbance of mixture of metals '**X**' and '**Y**' is 0·945 and 0·287 at 500 nm and 390 nm respectively, in a cell of 1 cm length.
Calculate the molar concentration of metals '**X**' and '**Y**'.

(c) Explain with suitable examples the various types of chemical interferences encountered in AAS. **7**

OR

(c) Describe characteristics features of arc source. Explain the sample handling techniques used in arc spectroscopy. Discuss its applications. **7**

[TURN OVER

3. (a) Describe the Ion Trap Mass Analyser used in mass spectroscopy.

OR

(a) With the help of a suitable diagram, explain energy dispersive instrument used in X-ray fluorescence. What are its advantages ? 7

(b) Name the different types of IR radiation sources. Describe any one of them in detail. 6

(c) With respect to NMR spectroscopy, explain 7

(i) Chemical shift (ii) Spin spin splitting.

OR

(c) What are different components of X-ray spectrometer ? Name the three types of sources used in X-ray instrument. With the help of schematic diagram describe X-ray tube source. 7

4. (a) What are the limitations of solvent extraction ? Describe the technique of solid phase extraction. 7

OR

(a) Describe the construction and working of reciprocating pump used in HPLC. 7

(b) Define : Distribution Ratio 6

150 cm^3 of an aqueous solution containing 120mg of the solute was extracted once with 25cm^3 of ether and 80 mg of the solute was transfered to ether. Calculate minimum number of extractions, by using 25 cm^3 of ether for each extractions, so that not more than 5 mg of the solute remains in the aqueous solution.

(c) GSC has limited applications as compared to GLC. Explain. 7

Give an account of different columns used in GLC.

OR

(c) With the help of a labelled diagram, explain the working of refractive index detector used in HPLC. What are its merits and demerits ? 7

5. (a) What are ion selective electrodes ? With schematic diagram, describe liquid membrane electrode that is used for determination of divalent cations. 7

OR

(a) Discuss cyclic voltametry with respect to – 7

(i) Potential - time curve (ii) Current voltage curve.

(b) What is the working potential range of a dropping mercury electrode. 6

Calculate the concentration of Cd(II) ions in a solution which gave diffusion current of 60 μA.

[Given : Diffusion coefficient of Cd(II) = $6{\cdot}0 \times 10^{-6}$ cm^2/s

Droptime = 2s

Rate of flow of mercury = 2·7 mg/s]

(c) Describe the setup used in amperometric titrations. What are advantages of rotating platinium electrode ? 7

OR

(c) What is stripping analysis ? What is purpose of electrodeposition steps in stripping analysis ? Why are stripping methods are more sensitive than other voltametric method ? 7

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Con. 1367–13.

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(3 Hours)

[Total Marks :

22nd April.

N. B. : (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.

1. Attempt any **five** of the following :– **20**
   (a) What are the characteristics of odd electron molecules ? Explain the bond order of any two molecules.
   (b) Describe the abelion point group with an example.
   (c) State the 16 electron rule. Show whether the following complexes obey the rule by writing the electron count.
      (i) $[Ticl_2 (\eta^5 - C_5H_5)_2]$
      (ii) $[Ni (\eta^3 - C_3H_5)_2]$
      (iii) $[Cr (\eta^5 - C_5H_5) (\eta^6 - C_6H_5)]$
   (d) Discuss complementary and non complementary reactions.
   (e) Write five applications of titanium metal.
   (f) Give the components and important uses of –
      (i) Babbit metal (ii) Wood's metal.
   (g) Name the various pseudohalogens and write one method of preparation of any two pseudohalogens.
   (h) Explain the somatic effect caused by radiation pollution.

2. (a) By using the concept of hybridisation, explain the structure of BCl_3 molecule and obtain expression for wave functions of hybrid orbitals. **7**

OR

   (a) What is resonance ? Derive an expression for resonance energy. **7**
   (b) Discuss reducible and irreducible representations using suitable examples. **6**
   (c) Explain the various types of Vander Waal's forces by using an example for each type. **7**

OR

   (c) Write matrix representations in the X, Y, Z axes for the symmetry operations in water molecule and describe it. **7**

3. (a) Explain the inner–sphere mechanism in ligand substitution reactions. **7**

OR

   (a) Write two methods of preparation of dibenzene chromium and explain it's structure and bonding on the basis of Valence Bond Theory. **7**
   (b) Discuss one method of preparation and two chemical properties of a metal alkyne complex. **6**
   (c) What is trans effect ? Explain the polarization theory of trans effect. **7**

OR

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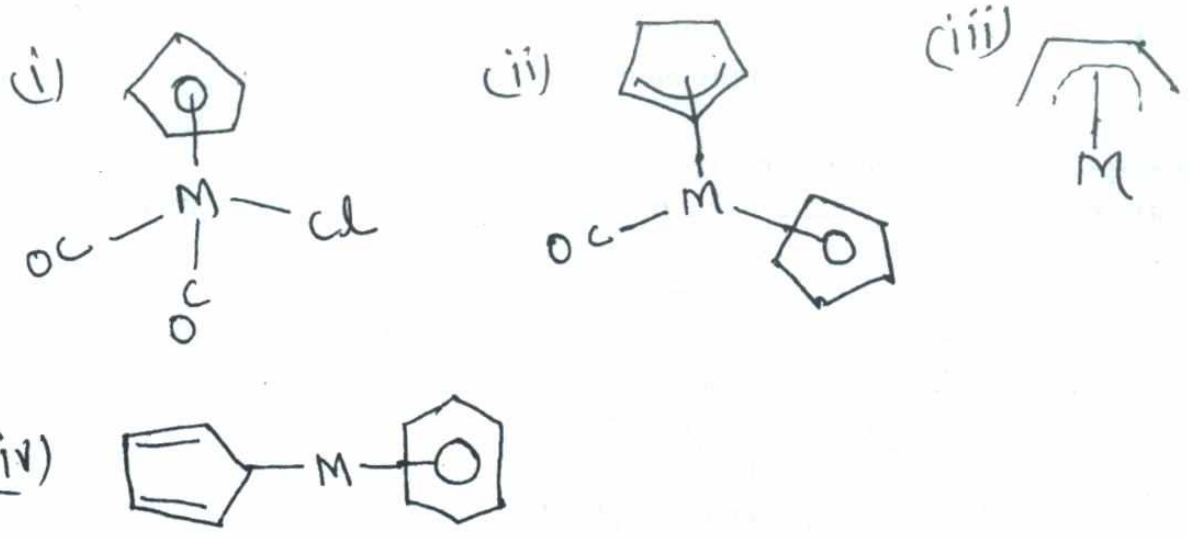
(c) Define ligand hapticity. Find the hapticity of each ligand in the following complexes. 7



4. (a) Explain the characteristics of Fluorite structure with reference to Calcium fluoride molecule. 7

OR

(a) Discuss the method of peparation of a super conducting material by the precursor method. Give the merits and demerits of this method. 7

(b) With reference to the chemistry of Vanadium write the following : 6

(i) Name two ores with the formula
(ii) One method of extraction
(iii) Applications (any four).

(c) Define on alloy. Explain the various types of solid solutions of alloys. 7

OR

(c) Write a detailed note on :– 7

(i) Variable oxidation states and
(ii) Magnetic properties of iron group elements.

5. (a) What are pseudohalogens ? Give any two methods of preparation and uses of– 7

(i) Azido carbon-di-sulphide
(ii) Thiocyanogen.

OR

(a) What is meant by active transport of metabolites ? Describe the primary active transport of metabolite by calcuim ion pump. 7

(b) What are phosphazenes ? Give the structure of different types of phosphazenes and give their uses. 6

(c) Discuss the sources, toxicology and toxicity of Arsenic. 7

OR

(c) Discuss how nuclear energy produces electrical energy. 7

M.SC (Part I) By Reseal
Microbiology, paper IV Appl
Microbiology

mk.95-1st hlf 13-H

Con. 5996-13. **PL**

By Papers] (3 Hours) **[Total Marks :**

By Research] (3 Hours) **[Total Marks : 100**

29 April 2013

N.B. (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks assigned to the question.

1. Comment on any **three** of the following :— **15/21**
   (a) Biodiversity in the soil ecosystem
   (b) Factors governing shelf life of food
   (c) Development and interactions of microbes in ecosystem
   (d) Marine microflora
   (e) Significance of microbial standards for food.

2. (a) Write an essay on any **one** of the following :— **10/10**
      (i) Significance of biofilms in establishing infections.
      (ii) Microbial life at low temperature and high pressure.
   (b) Answer any **one** of the following :— **5/6**
      (i) Mycorrhizae and plant association
      (ii) Adaptation of micro organisms to nutrient limitation.

3. Discuss any **three** of the following :— **15/21**
   (a) Study of soil microflora by direct microscopic techniques
   (b) Nucleic acid based analytical techniques
   (c) Study of VBNC bacteria
   (d) Significance of radioisotopes in study of microbial ecosystem
   (e) Applications of immunological assays in ecosystem.

4. Explain any **three** of the following :— **15/21**
   (a) Soil fertility management
   (b) Applications of enzymes in food industry
   (c) Farm waste management
   (d) Microbial analysis of meat products
   (e) Azolla-Anabena association and its importance.

5. Write short notes on any **three** of the following :— **15/21**
   (a) Role of microbes in spoilage of food
   (b) Microbial corrossion
   (c) Symbiotic nitrogen fixation
   (d) Physiological approaches in the study of soil ecosystem
   (e) Management of acid soil.

M.Sc (Part I) By Re
Microbiology Paper III Micro
Biochemistry

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Con. 5992-13.

By Papers]

By Research]

(3 Hours)

[Total Mark

[Total Marks : 10

26 April 201

N.B. : (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.

1. (a) Explain any **two** of the following :– **10/10**
   (i) Mechanism of action of allosteric enzymes
   (ii) Purification of proteins using iso-electric precipitation
   (iii) Protein structure software.
   (b) Write a note on any **one** of the following :– **5/6**
   (i) Determination of active site of an enzyme
   (ii) Mitochondrial DNA.

2. With the help of metabolic reactions/diagrams, explain any **three** of the following :– **15/21**
   (a) Degradation of methionine to succinyl CoA
   (b) Serine isocitrate lyase pathway in methylotrophs.
   (c) Biosynthesis of tyrosine from PEP and E4P.
   (d) Biosynthesis of phycobiliproteins.

3. Discuss any **three** of the following :– **15/21**
   (a) Translocation of membrane bound proteins
   (b) Metabolism of alkanes by bacteria
   (c) Phototrophic procaryotes
   (d) Membrane and transport lipids.

4. (a) Write an essay on any **one** of the following :– **10/14**
   (i) Electrophoresis
   (ii) Two component signalling system in bacteria.
   (b) Give significance of any **one** of the following :– **5/7**
   (i) Porins
   (ii) Starvation stress.

5. Write short notes on any **three** of the following :– **15/21**
   (a) Advantages and disadvantages of immobilization of enzymes
   (b) Ribulose monophosphate pathway in methylotrophs
   (c) Trp operon
   (d) HPLC.

Con. 7984–13.

By Papers] (3 Hours) **[Total**
By Research] (3 Hours) **[Total Mar**

18 April 2

N.B. (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks assigned to the question.

1. (a) Write an essay on any **one** of the following :— **10/10**
   (i) Cultivation and study of anaerobes.
   (ii) Molecular analyses in taxonomy : characteristics, methods, advantages and limitations.
   (b) Attempt any **one** of the following :— **5/6**
   (i) Explain the features of Viroids and the diseases caused by them.
   (ii) Write a note on sample preparation for electron microscopy.

2. Answer any **three** of the following :— **15/21**
   (a) Write a brief note on cellular evolution.
   (b) Distingiush between SEM and TEM.
   (c) Give a brief account of immunoelectron microscopy technique.
   (d) What is fluorescence microscopy ? State the significance of fluorescent dyes.

3. Answer any **three** of the following :— **15/21**
   (a) Describe Genomic fingerprinting and state its significance as an identification tool for bacteria.
   (b) Justify : Archaebacteria posses unique molecular and biochemical features.
   (c) Discuss sequence alignment by K-tuple method.
   (d) Justify : rDNA molecules are important as evolutionary chronometers.

4. Attempt any **three** of the following :— **15/21**
   (a) Discuss the role of oncogenes, in human cancer.
   (b) What is micropropagation ? Discuss its applications.
   (c) Discuss various features of viruses used for their classification.
   (d) Give principle of ELISA and discuss its applications in virology.

5. Answer any **three** of the following :— **15/21**
   (a) Discuss the structure and function of chloroplasts
   (b) Describe the events of aging in *S.cereviseae*.
   (c) Give diagram and principle of a chemostat, laying emphasis on dilution rates.
   (d) Give a detailed account of the events occuring in the stationary phase of bacterial growth.

M.Sc
Biochemistry paper II Mo... ...r Biology
Industrial Biochemeistry & A... ...ied
Techniques

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Con. 2538-13.

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(3 Hours) **[Total Marks :**

22 April 20...

N.B. : (1) **All** questions are **compulsory**.
(2) **All** questions carry **equal** marks.
(3) Attempt any **one** question out of **a** and **b**.
(4) Attempt any **one** question out of **c** and **d**.
(5) Draw **flowcharts** and **diagrams** wherever **necessary**.
(6) Answerbooks of **Section I** and **Section II** to be **tied together**.

Section I

1. (a) Describe gluconeogenesis using lactate as precursor. 5

OR

(b) Explain glycogenolysis and its regulation. 5
(c) Give an account of regulation of blood glucose level by Insulin and Epinephrine. 5

OR

(d) Explain photosynthesis in C4 plants. 5

2. (a) Explain β-oxidation of even carbon fatty acids and its regulation. 5

OR

(b) Discuss white Adipose tissue metabolism. 5
(c) Give an account of catabolism of Tyrosine. 5

OR

(d) Explain transamination with suitable examples and give its significance. 5

3. (a) Describe synthesis of pyrimidine nucleotides by salvage pathway. 5

OR

(b) Discuss catabolism of purine nucleotides. 5
(c) Explain protein caloric malnutrition syndrome. 5

OR

(d) Describe various anthropometric measurements used in field of nutrition. 5

4. (a) Describe catabolism of Hemoglobin. 5

OR

(b) What is metabolic and respiratory alkalosis ? Discuss its compensation. 5
(c) Name all the enzymes used in liver function tests. Explain their significance. 5

OR

(d) Enlist any four neurotransmitors and their role. 5

5. (a) Classify immunoglobulins and write their functions. 5

OR

(b) Describe method of producing antibodies against proteins in laboratory animals. 5
(c) State the principle of ELISA. Discuss various types of ELISA and their applications. 5

OR

(d) Discuss cellular and humoral immunity in T and B cells. 5

[TURN OVER

Section II

6. (a) What is principle, technique and applications of density gradient centrifugation ? 5

OR

(b) Describe the principle and methodology of IR spectroscopy. Write its significance. 5

(c) Explain hazards in handling of radioisotopes and their safety measures. 5

OR

(d) Write principle and methodology of scanning electron microscopy and give its applications. 5

7. (a) Explain principles involved in designing good research. 5

OR

(b) Describe various types of research and give its significance. 5

(c) Discuss different methods involved in data collection. 5

OR

(d) Explain mechanics and precautions of writing reports for scientific journals and symposia. 5

8. (a) What is standard deviation and standard error ? Give their significance. 5

OR

(b) What is Gaussian distribution ? Discuss it with its applications. 5

(c) What is paired 't' test and state its application with suitable example ? 5

OR

(d) Give an account of ANOVA. 5

9. (a) Discuss in detail linear regression. 5

OR

(b) What are analysis choices for multiple regression ? 5

(c) Explain in detail the applications of Chi-square test. 5

OR

(d) Give the details of Yates correction as applied to Chi-square test. 5

10. (a) Explain the role of computers in information retrival from databases. 5

OR

(b) Write a note on Genomic data bank. How information is retrived and applied ? 5

(c) How sequence alignment is carried out ? 5

OR

(d) Discuss the term "Proteomics". How it is important in modern biology research ? 5

M.Sc. By Research (Theory)
Chemistry : Paper I & II - Organic [illegible]istry

mk.59-1st hlf 13-C

Con. 1445-13.

(3 Hours) **[Total Marks**

26th April.

N.B. (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.

1. Answer any **five** of the following :— **20**

(a) Explain the chirality of alkylidene cycloalkanes with examples.

(b) Give $B_{AL}1$ mechanism of ester hydrolysis.

(c) Complete the following reaction and explain its mechanism :—

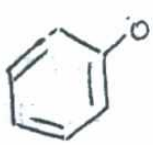
$$n\ C_3H_7—\underset{\underset{O}{\|}}{C}—OC_2H_5 \xrightarrow[(2)\ H_3O^+]{(1)\ Na/Xylene} ?$$

(d) Predict the products and name the following reactions :—

(i) $(CH_3)_2\ CH\ CHO + HCHO + (CH_3)_2\ NH \xrightarrow{HCl} ?$

(ii) $(C_6H_5)_2\ C = O + \underset{\underset{CH_2COOC_2H_5}{|}}{CH_2COOC_2H_5} \xrightarrow[(CH_3)_3COH]{KOC(CH_3)_3} ?$

(e) Complete the reaction and give the mechanism —

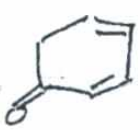


$+ (CH_3)_2\ N\ CHO \xrightarrow[(2)\ H_2O]{(1)\ POCl_3,\ \Delta} ?$

(f) Give the applications of chromium reagents in organic synthesis.

(g) With the help of U.V. spectra how will you distinguish between the following isomers :—

and



(h) (i) Explain molecular ion in mass spectrometry.
(ii) Explain two factors affecting vicinal coupling constant J.

2. (a) (i) What are homotopic and enantiotopic ligands ? Explain how they are identified using substitution and symmetry criteria with suitable examples. **5**

(ii) Give examples of any two types of chiral tetra co-ordinate nitrogen compounds. **2**

OR

(a) Explain the following :—

(i) Mechanism of S_Ni reaction including stereochemistry. **4**

(ii) Benzyne mechanism with suitable example. **3**

(b) Explain the following :—

(i) Chloroacetic acid in stronger than acetic acid.

(ii) The stability of t-butyl carbocation based on hyperconjugation.

(iii) Ambident nucleophiles with suitable examples. 2

(c) Give reasons for the following :—

(i) Aromatic amines are less basic than aliphatic amines. 3

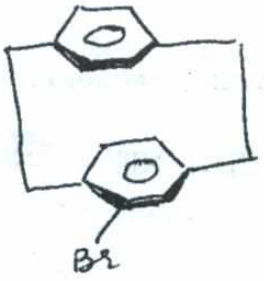
(ii) O-Nitrophenol is more acidic than phenol. 2

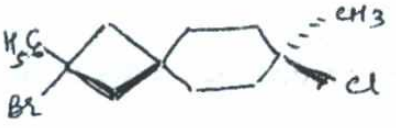
(iii) O-Hydroxy benzoic acid in more acidic than p-hydroxy benzoic acid. 2

OR

(c) (i) Explain the erythro-threo system of nomenclature using 2, 3-dibromobutanal as an exmple. 3

(ii) Assign configurational descriptors to the following :— 4

(I) 

(II) 

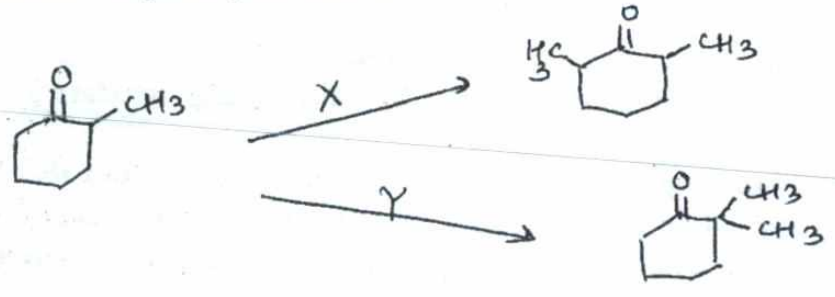
3. (a) Complete the following reactions and explain their mechanisms :—

(i) $(CH_3)_2C = CH\,\overset{O}{\overset{\|}{C}}—CH_3 + CH_2(COOC_2H_5)_2 \xrightarrow[C_2H_5OH]{C_2H_5ONa} ?$ 4

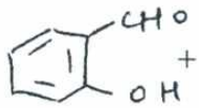
(ii) $CH_3CH(Br)—\overset{O}{\overset{\|}{C}}—CH_3 \xrightarrow{CH_3ONa} ?$ 3

OR

(a) State the complete reaction conditions X and Y required for the following conversions. Explain your choice. 7



(b) Complete the following reactions and name them :— 6

(i)  $+ (CH_3CO)_2O \xrightarrow{CH_3COONa} ?$

(ii)  $+ CH_3\underset{\underset{Br}{|}}{CH}COOC_2H_5 \xrightarrow[(2)\ H_3O^+]{(1)\ Zn\text{-}ether} ?$

(iii) $CH_3CH_2CH_2COOCH_3 \xrightarrow[(2)\ H_3O^+]{(1)\ C_2H_5ONa} ?$

(c) (i) Write a complete equation to represent Robinson annulation. 3

(ii) Write complete equations for :— 4

(I) McMurry coupling on cyclohexanone

(II) Aldol condesation on butanal.

OR

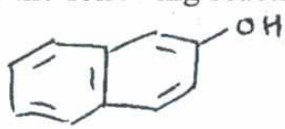
(c) (i) Give equations for the preparation of the following using Grignard reagent :— 4

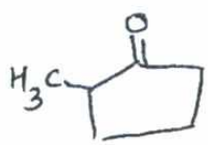
(I) Carboxylic acids

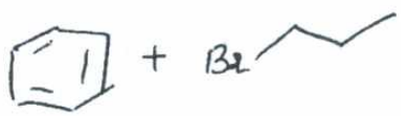
(II) Tertiary alcohols.

(ii) Write a complete reaction to represent the Knovenagel reaction. 3

4. (a) Complete the following reactions and name them :— 7

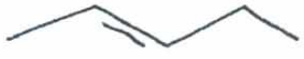
(i)  $\xrightarrow[KOH]{CHCl_3} ?$

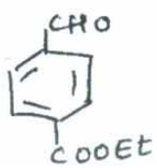
(ii)  $\xrightarrow{HN_3/H_2SO_4} ?$

(iii)  $\xrightarrow{AlCl_3} ?$

OR

(a) Predict the products and give the mechanism involved in the following :— 7

(i)  $\xrightarrow{SeO_2} ?$

(ii)  $\xrightarrow[EtOH]{NaBH_4} ?$

(b) Explain Curtius rearrangement. Give the mechanism and two applications.

(c) Explain :

(i) Wolff-Kishner reduction with mechanism. 4

(ii) Epoxidation using peracid with an example. 3

OR

(c) (i) Explain the mechanism of Birch reduction. 3

(ii) Give synthetic applications of lead tetra acetate with suitable examples. 4

5. (a) (i) An organic compound with molecular formula C_7H_8O is not acid, can be easily oxidised to a crystalline compound with m.p. 122°C. It gives the following spectral data : 5

UV : λ_{max} 255 nm (ϵ_{max} = 202)

IR : 3402 cm^{-1} (s, br), 3065 (w), 2888 (m), 1499 (w), 1455 (m)

^1H NMR : δ 3·90 (s), 4·6 (s), 7·26 (s, 5H)

mass spectra m/z 108, 77, 51 : Deduce the structure of the compound.

(ii) Taking 1-methyl cyclohexene as an example explain retro Diels Alder reaction. 2

OR

(a) (i) What is anisotropic effect ? Explain why the aromatic protons are more de shielded than ethylenic protons even though both the types of protons are attached to Sp^2 hybridised carbon atoms. 4

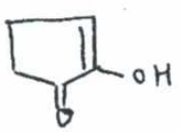
(ii) Give the importance of IR region between 4000 cm^{-1} to 2000 cm^{-1} for the detection of functional groups. 3

(b) (i) Explain the following :— 4

(I) Spin-spin coupling in NMR spectroscopy

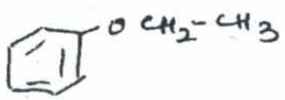
(II) Vibrational coupling in IR specroscopy

(ii) Calulate λ_{max} of the following compound :— 2



(c) (i) Give the fragmentation patterns for the following compounds :— 4

(I) 

(II) 

(ii) How are the following compounds distinguished by U.V. spectroscopy ? 3

$H_3C\ CH = CH—COCH_3$ and $H_2C = CH—CH_2—\overset{\overset{O}{\|}}{C}—CH_3$

OR

(c) (i) Write note on : McLafferty rearrangement in mass spectrometry. 4

(ii) D_2O exchange in NMR spectroscopy. 3

M-Sc. By Research (Theory)
Chemistry : Paper I Physical

P3-upq-Feb.-13KL-156

Con. 1359–13.

(3 Hours) **[Total Marks :**

18th April. 0

N.B. : (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **maximum** marks.
(3) Use of **non-programmable** scientific **calculator** is allowed.

Useful constants :

$c = 2{\cdot}998 \times 10^{8} ms^{-1}$
$h = 6{\cdot}626 \times 10^{-34}$ Js
$R = 8{\cdot}314$ JK^{-1} mol^{-1}
$m_e = 9{\cdot}110 \times 10^{-31}$ kg
$k = 1{\cdot}3811 \times 10^{-23}$ JK^{-1}
$N = 6{\cdot}022 \times 10^{23}$ mol^{-1}
$e = 1{\cdot}602 \times 10^{-19}$ C
$1\ J = 6{\cdot}24 \times 10^{18}$ eV
$1\ eV = 8{\cdot}06 \times 10^{3}$ cm^{-1}

1. Attempt any **five** of the following :— **20**
   (a) What is fugacity ? How is it evaluated for a real gas ?
   (b) State the expression for Boltzman distribution function. Explain the terms involved in it.
   (c) Explain giving reasons the important applications of fuel cells.
   (d) State Debye-Huckel Onsager equation. How its validity can be checked graphically ?
   (e) Determine the degree of degeneracy for energy levels $\frac{11h^2}{8ma^2}$ for a particle in cubical box.
   (f) What is state function in quantum mechanics ? Give its characteristics.
   (g) Explain :—
      (i) Potential energy surfaces
      (ii) Oscillating reactions.
   (h) Predict the effect of ionic strength on rate constant of the following reactions :
      (i) $C_{12}H_{22}O_{11} + H^{+} \rightarrow$ Products
      (ii) $2Cu^{2+} + 4I^{-} \rightarrow 2CuI + I_2$
      (iii) $S_2O_8^{2-} + 2I^{-} \rightarrow 2SO_4^{2-} + I_2$
      (iv) $[PtCl_4]^{2-} + OH^{-} \rightarrow$ Products

2. (a) What is partition function ? Derive an expression for rotational partition function of a diatomic molecule. **7**

OR

(a) Explain the terms :— **7**
   (i) Joule–Thomson coefficient
   (ii) Inversion temperature.

(b) (i) Calculate the molar residual entropy of a crystal in which molecules can adopt five orientations of equal energy at absolute zero. **6**
   (ii) Calculate the value of molar residual entropy for NO molecules at absolute zero.

(c) What is Clausius inequality ? Derive expression for same.

OR

(c) Derive the following :— 7

(i) $\left[\frac{\partial T}{\partial P}\right]_s = \left[\frac{\partial V}{\partial S}\right]_p$

(ii) $\left[\frac{\partial T}{\partial V}\right]_s = -\left[\frac{\partial P}{\partial S}\right]_v$

3. (a) Derive Gibbs adsorption isotherm equation. 7

OR

(a) Explain the following terms with respect to three component system. 7

(i) binodal curve
(ii) plait point
(iii) tie line.

(b) Calculate the mean ionic activity coefficient of $ZnCl_2$ in a solution containing $25cm^3$ of 0·1m $ZnCl_2$, 25 cm^3 of 0·2m NaCl and $50cm^3$ of water. 6

[Given A = 0·509 for water at 298K]

(c) Explain the terms :— 7

(i) Sacrificial anode (ii) Cathodic inhibitor.

OR

(c) What are first order and second order phase transitions ? Give their characteristics. 7

4. (a) Obtain the asymptotic solution for quantum mechanical linear harmonic oscillator. 7

OR

(a) Obtain the Schrodinger wave equation for a particle of mass 'm' in three dimensional box. 7

(b) State the Hermitian polynomial as derived from generating functions and solve it for n=1 and n=2. 6

(c) Explain the terms— 7

(i) Hamiltonian Operator (ii) Hermitian Operator

OR

(c) Give the salient features of Huckel approximation in molecular orbital theory. 7

5. (a) On the basis of Collision theory derive an expression for the rate constant of a bimolecular reaction. What are the limitations of Collision theory ? 7

OR

(a) What are fast reactions ? Explain the flash photolysis technique to study the kinetics of fast reaction. 7

(b) The rate constant of a second order reaction is $5{\cdot}7 \times 10^{-5}$ dm^3 mol^{-1} s^{-1} at 298K and $1{\cdot}64 \times 10^{-4}$ dm^3 mol^{-1} s^{-1} at 313K. Calculate activation energy and Arrhenius pre-exponential factor. 6

(c) What is steady state approximation ? Apply it to obtain the rate law equation for decomposition of ozone. 7

OR

(c) Discuss Lindeman–Hinshelwood mechanism of unimolecular reactions. 7

M.Sc (part II) By S[illegible]rch
Microbiology Paper VI Ad[illegible]s in
Biotechnology

11 : 1ST HALF-13 [illegible]

Con. 1491 [illegible] P[illegible]

25 April 2013

For Paper Students] (3 Hours) **[Total Marks**
For Research Students] (3 Hours) **[Total Marks : 10**

N.B. (1) **All** questions are **compulsory**.
(2) For **Paper** students, **each** question carries **15** marks.
(3) For **Research** students, **each** question carries **20** marks.

1. (a) Discuss any **one** :— **7/10**
   (i) Role of genetic engineering in the synthesis of polyketide antibiotics.
   (ii) Approaches to change the catalytic activity and substrate specificity of an enzyme using recombinant DNA technology.
   (b) Explain any **one** :— **8/10**
   (i) The general features and types of Biosensors.
   (ii) The 'Four Pillars' of the metabolic control analysis theory.

2. (a) Justify any **one** :— **7/10**
   (i) Plant growth promoting bacteria produce various products that limit the damage caused by Phytopathogens.
   (ii) Plants can be used as bioreactors.
   (b) Discuss any **one** :— **8/10**
   (i) Production of marker free transgenic plants
   (ii) Use of reporter genes in transformed plant cells.

3. (a) Describe any **one** :— **7/10**
   (i) The mode of action of *B.thuringiensis* toxin and use of the toxin in biocontrol.
   (ii) Ethanol Production Methods from Biomass.
   (b) Discuss any **one** :— **8/10**
   (i) Environmental Toxicity testing using biological methods
   (ii) Gaseous Bioremediation.

4. (a) Discuss any **one** :— **7/10**
   (i) Production of transgenic mice by the 'Engineered Embryonic Stem Cell' method.
   (ii) Microbial synthesis of Nanoparticles and state two applications in the medical field.
   (b) Explain any **one** :— **8/10**
   (i) The requirements for a process or product to be Patentable and the steps of Patenting.
   (ii) Cloning of Livestock by transfer of nucleus.

5. (a) Write short notes on any **three** :— **12/15**
   (i) Bioaugmentation
   (ii) Significance of Immobilised enzymes
   (iii) Open field testing of GMOs
   (iv) Phytoremediation.
   (b) Answer any **one** :— **3/5**
   (i) Explain the features of 'Biolac'
   (ii) How can indigo be produced in *E.coli* ?

M.Sc (Part II)

1r: 1ST HALF-13 (f)-JP

Microbiology paper IV Immunology

Microbiology in Health Science

Cc. 1487–13.

For Paper Students] (3 Hours) **[Total Marks**

For Research Students] (3 Hours) **[Total Marks : 10**

20 April 2013

N.B. (1) **All** questions are **compulsory**.
(2) For **Paper** students, **each** question carries **15** marks.
(3) For **Research** students, **each** question carries **20** marks.
(4) Draw **neatly** labelled diagrams wherever **necessary**.

1. (a) Substantiate any **one** of the following :— **8/10**
   (i) Several factors may contribute to T-cell mediated generation of autoimmune disease.
   (ii) CMI is important for viral control and clearance.
   (b) Discuss any **one** of the following :— **7/10**
   (i) Mechanisms developed by tumors for evasion of the immune system.
   (ii) Typing methods employed for assessing tissue compatibility between donor and recepient.

2. (a) Justify any **one** of the following :— **8/10**
   (i) Disease surveillance is an important mission of public health organizations.
   (ii) Delivery of bioweapons is as important as its selection.
   (b) Justify any **one** of the following :— **7/10**
   (i) Epidemiologists classify diseases based on their frequency and distribution in a population
   (ii) *Candida albicans* causes a diverse spectrum of human diseases.

3. (a) Explain any **one** of the following with the help of a diagram :— **7/10**
   (i) Process of RNA interference
   (ii) Use of Western Blotting in the identification of protein in a complex mixture of proteins.
   (b) Give an account of any **one** of the following :— **8/10**
   (i) Plant cell culture
   (ii) Clinical uses of stem cells.

4. (a) Write a short note on any **one** of the following :— **7/10**
   (i) Development and conduct of a clinical trial
   (ii) Control of nosocomial infections.
   (b) Explain any **one** of the following :— **8/10**
   (i) Reponsibilities of the sponsor/coordinating centre with respect to good clinical practice.
   (ii) The relative merits of Salk and Sabin vaccines with regard to safety, efficiency, ease of administration and economy.

5. (a) Attempt any **three** of the following :— **12/15**
   (i) Explain the uses of monoclonal antibodies as immunotherapeutics.
   (ii) Give two points of similarity and difference between :—
   (I) reservoir (II) vector.
   (iii) Write a short note on bone narrow transplants.
   (iv) Discuss the features of insect cell culture.
   (b) Attempt any **one** of the following :— **3/5**
   (i) Comment on use of viral glycoproteins as submit vaccines
   (ii) Explain the terms :
   (I) Xenograft (II) neoplasm (III) Sequestered antigen.

M. Sc Biochemistry paper I Ger

AGJ 1st half (m) 16

Con. 2530-13.

(3 Hours) Biochemistry Total Mark

18 Apri

N.B. : (1) **All** questions are **compulsory**.
(2) **All** questions carry **equal** marks.
(3) Attempt any **one** question out of **a** and **b**.
(4) Attempt any **one** question out of **c** and **d**.
(5) Draw flow charts and diagrams wherever **necessary**.
(6) Answerbooks of **Section I** and **Section II** to be tied **together**.

Section I

1. (a) Compare the structural and functional organization of Prokaryotic and Eukaryotic cell. 5

OR

(b) Name the various types of transport mechanisms and explain any one in brief. 5

(c) What is Apoptosis ? What are the structural and functional changes occur when cell undergo apoptosis. 5

OR

(d) Describe in brief the Eukaryotic cell cycle. 5

2. (a) Give classification of Carbohydrates with suitable examples. 5

OR

(b) Discuss classification of Phospholipids and state their functions. 5

(c) Classify Aminoacids giving examples. 5

OR

(d) Describe separation of proteins by salt precipitation and solvent precipitation. 5

3. (a) Discuss the factors affecting rate of enzyme catalysed reactions. 5

OR

(b) Classify enzymes as per IUB classification giving examples. 5

(c) What are Allosteric enzymes ? Explain allosteric activation and inhibition using suitable example. 5

OR

(d) Discuss the Diagnostic importance of enzymes and isoenzymes. 5

4. (a) State the sources, RDA, biological functions and deficiency manifestations of Vit. A. 5

OR

(b) Name the coenzyme form, biochemical role and deficiency manifestations of niacin. 5

(c) Give various trace elements and give their functions. 5

OR

(d) Give mechanism of action of steroid harmones. 5

5. (a) Explain the term entropy and enthalpy. 5

OR

(b) Discuss ETC, its inhibitors and uncouplers. 5

(c) What is Buffer ? Explain the derivation and significance of Henderson Hassel-balch equation. 5

OR

(d) Explain the term "Adsorption" and "Viscosity" and give their significance. 5

Section II

6. (a) Describe Watson and Crick model of DNA. 5

OR

(b) What are DNA topoisomerase ? Explain their action. 5

(c) Discuss structure and functions of t-RNA. 5

OR

(d) Describe the process of transcription and its regulation using lac operon. 5

7. (a) What is Genetic Code ? Explain its characteristics. 5

OR

(b) Explain the process of Translation. 5

(c) Describe bacterial conjugation and its significance. 5

OR

(d) Explain the process of transfections state its importance in recombinant DNA technology. 5

8. (a) What is Cloning ? How cloning of chimeric DNA carried out. 5

OR

(b) Give different types of vectors and their importance. 5

(c) Explain principle, technique and applications of "Southern Blotting". 5

OR

(d) Write short note on SDS-PAGE. 5

9. (a) Describe the principle and applications of tissue culture. 5

OR

(b) State the principle, design and types of aerobic fermenter. 5

(c) Define COD, BOD and state their importance. 5

OR

(d) Explain the normal composition of the atmosphere name the various natural and man made pollutant of air. 5

10. (a) Explain the principle, technique and applications of Ionexchange chromatography. 5

OR

(b) Explain the principle, technique and applications of affinity chromatography. 5

(c) Explain principle and applications of isoelectric focusing. 5

OR

(d) State principle, methodology and applications of gel filtration. 5

M.Sc (Part II) By · Re...h
Microbiology Paper VII Quality ...gment + Systems in Microbiological Practices

13 : 1ST HALF-13 (f)-JP

Con. 1494-[illegible].

27 April 2013

By Paper] (3 Hours) **[Total Marks**
By Research] (3 Hours) **[Total Marks : 1**

N.B. (1) **All** questions carry **equal** marks.
(2) For **Paper** students **each** question carries **15** marks.
(3) For **Research** studetns **each** question carries **20** marks.

1. (a) Answer any **one** :— **7/10**
   (i) Discuss validation and in-process monitoring of sterilization procedures.
   (ii) Give an account of tests involved in quality control for vaccine production.
   (b) Attempt any **one** :— **8/10**
   (i) Several factors influence GMP of pharmaceuticals. Justify.
   (ii) Write a note on Statistical Process Control Tools, stating the significance of each of them.

2. (a) Discuss any **one** :— **7/10**
   (i) The importance of D and Z value in determining the efficiency of a sterilizing agent.
   (ii) Molecular methods used for detection and characterization of pathogens associated with toxin production.
   (b) Describe any **one** :— **8/10**
   (i) Antibacterial disinfectant efficiency tests.
   (ii) An appropriate HACCP plan for production of frozen pizza.

3. (a) Answer any **one** :— **7/10**
   (i) Organic acids and their salts are widely used as preservative in food industry. Jusify.
   (ii) A variety of osmoregulatory mechanisms are adapted by different micro-organisms. Discuss.
   (b) Answer any **one** :— **8/10**
   (i) Explain intermediate moisture foods and its significance.
   (ii) *Listeria monocytogenes* is a significant etiological agent of food borne infections. Justify.

4. (a) Explain any **one** :— **7/10**
   (i) The concept of quality and quality assurance.
   (ii) The key documnts associated at each level of documentation pyramid.
   (b) Explain any **one** :— **8/10**
   (i) The structure of a quality circle in an organization.
   (ii) The different types of audits and reasons for these audits.

5. (a) Attempt any **three** :— **12/15**
   (i) Enlist the information included in a calibration certificate and test report.
   (ii) Explain the principle involved in the use of steam as a sterilizing agent.
   (iii) Explain procedure for detecting any two indicator organism in water.
   (iv) Write short note on role of Regulatory Bodies in Pharma industry.
   (b) Answer any **one** :— **3/5**
   (i) Write a note on Laboratory Control Records
   (ii) Explain JIT.
