VCD 310323 S.Y.B.Sc. CHEMISTRY P-II SEM-IV MARKS:100 TIME:3HRS

NOTE: i) All the questions are compulsory.
ii) Figures to right indicate full marks.
iii) Use of non-programmable calculator/log table is allowed.

Q.1.A. Fill in the blanks with suitble option. (any TWELVE) **[12]**

1) The smallest repetitive unit of the crystal structure is known as.....
   a) Atoms
   b) Compound
   c) Unit cell
   d) Lattice
2) .....is Bragg's equation.
   a) $n\lambda = 2d \sin\theta$
   b) $\lambda = 2d \sin\theta$
   c) $n\lambda = 2 \sin\theta$
   d) $n\lambda = d \sin\theta$
3) Which of the following is not a category of catalysis?
   a) Homogeneous
   b) Heterogeneous
   c) Promotor
   d) Enzymatic
4) The enzyme which hydrolyses starch to maltose is.....
   a) Protease
   b) Amylase
   c) Lactase
   d) Maltase
5) How does a catalyst increase the rate of reaction?
   a) By forming intermediate
   b) By increasing activation energy
   c) By lowering activation energy
   d) By changing equilibrium constant
6) Dimer of NO_2 is.....
   a) NO_2
   b) N_2O_4
   c) N_2O_3
   d) N_2O
7) The cube has.....centre of symmetry.
   a) 1
   b) 2
   c) 4
   d) 3
8) .....lead to decrease the visibility.
   a) Photochemical smog
   b) Acid rain
   c) SO_2 gas
   d) Moisture
9) As the number of oxo-group increases; basicity .....
   a) Increases b) Decreases c) Is independent d) Remains constant

10) H_2SO_3 is.....
   a) Sulphuric acid
   b) Sulphurous acid
   c) Thioric acid
   d) Thiosulphuric acid

11) Higher the acidity of cation;.....will be the charge to radius ratio.
   a) More
   b) Less
   c) Zero
   d) Negative

12) Higher the value of hydration energy; higher will be .....of anion in aqueous solution.
   a) Acidity
   b) Basicity
   c) Solubility
   d) Neutrality

13) Pyridine has a ..... membered ring.
   a) 2
   b) 6
   c) 4
   d) 1

14) Which of the following compound is not aromatic?
   a) Furan
   b) pyrrole
   c) Pyridine
   d) Piperidine

15) Nitrogen atom in pyrrole is.....
   a) sp^2 hybridised
   b) sp^3 hybridised
   c) sp hybridised
   d) sp^3d hybridised

16) The process of the formation of diazonium salt is called as.....
   a) Oxidation
   b) Substitution
   c) Reduction
   d) Diazotisation

17) Amines are derivatives of.....
   a) Phenol
   b) Ammonia
   c) Alkane
   d) Acid

18) Furan has two conjugated double bonds i.e. .....
   a) 2π electrons
   b) 3π electrons
   c) 4π electrons
   d) 1π electrons

B. State whether following statement is true or false [3]

a) Crystal of same substance has same symmetry elements.
b) Photochemical smog is due to free radical reaction.
c) Pyrrole is strong acid in nature.

C. Match the following. [5]

a) Catalyst	i) Reducing agent
b) Zymase	ii) Photochemical smog
c) maltose	iii) convert glucose into ethyl alcohol
d) PAN	iv) increase the rate of the reaction
e) $LiAlH_4$	v) convert maltose into glucose

Q.2. Answer the following: (Any four) [20]

a) Describe the characteristic features of catalysis.
b) State the laws of symmetry.
c) Derive Michalis-Menten equation for enzyme catalysis.
d) Write a note on homogeneous and heterogeneous catalysis.
e) Describe possible crystals of Bravais lattices.
f) First order reflection of a beam of X-rays from (100) plane of NaCl occurs at an angle of 6.2°. Calculate the wavelength of X-rays. (d_{100} for NaCl is 282.0 pm)

Q.3.Answer the following: (Any Four) [20]

a) Explain hydrolysis of cation with equilibrium reaction relating pka to pH.
b) What are oxo-anions? Discuss with suitable predominance diagram.
c) Discuss physical properties, uses and sources of HNO_3.
d) What is predominance diagram? Explain stepwise hydrolysis of Cr^{3+} in aqueous medium.
e) Discuss Phosphorus cycle on land and water bodies with suitable diagram.
f) Write a short note on photochemical smog.

Q.4. Answer the following: (Any Four) [20]

a) What are heterocyclic compunds? Write name and structure of any four heterocyclic compunds.
b) Write electronic structure of pyrrole, furan, thiophene and pyridine.
c) Explain chichibabin reaction.
d) What is Azo coupling reaction? Give mechanism of Azo coupling reaction.
e) Explain Hantzsch synthesis of pyridine.
f) Explain the following.
(i) Aromatic amines are weaker base than aliphatic amine.
(ii) Para-nitro aniline is more basic than aniline.

Q.5. Answer the following: (Any Four) [20]

a) Describe and calculate unit cell of simple cube, face centre, and body centre cube.
b) What are X-rays? Explain how X-rays are produced.
c) Write a short note on acid rain.
d) Name of oxides and oxo-acids of phosphorus. Discuss their physical property, uses and common sources.
e) Explain Gomberg reaction with example.
f) Explain the aromaticity of furan and pyrrole.
