

Anjuman Islam Janjira Degree College of Science

Murud-Janjira, Raigad-402401
Affiliated to University of Mumbai
As per NEP 2020

Class: -S.Y.B.Sc.(G.S)	Subject: - Minor Chemistry (General Principles of Chemistry II)
Semester: - IV	Course code: - S3MN41
Exam Event: - Summer 2026 (FH)	Marks: - 30
Date: - 7/03/2026	Duration: - 1:00 Hours

Q.1 (A) Select the correct option & complete the sentences (Any Four)

4

- Bragg's equation is _____
a) $n\lambda = 2d \sin \theta$ b) $n\lambda = d \sin \theta$ c) $n\lambda = (d/2) \sin \theta$ d) $N\lambda = d$
- X-rays are used for diffraction in solids because _____
a) λ of X-rays are small b) λ of X-ray match with interplanar distance
c) scattering of X-rays easy d) X-rays can penetrate crystal
- Intercepts of a face of a cubic crystal on x, y, z axes are 2a, 2a and 3a. The Miller indices of the plane are:
a) 332 b) 223 c) 222 d) 662
- How many atoms are present in one-unit cell of a body-centered cubic (BCC) lattice?
a) 2 b) 4 c) 1 d) 8
- In a Coolidge tube, the cathode is made up of _____
a) Tungsten b) Aluminium c) Silver d) Bronze
- Na^+Cl^- has density 2.17 gm/cm^3 . If X-rays ($\lambda = 0.58 \text{ \AA}$) is used for diffraction from front plane, the angle for maximum reflection is _____.
a) 5.9° b) 10.1° c) 12.5° d) 14°

(B) Attempt any One of the following. (Any One)

4

- Explain the use of X-rays in the study of crystal structure.
- Explain, with neat diagrams, the following cubic lattices:
a) Simple cubic b) Face-centered cubic c) Body-centered cubic

Q.2 (A) Select the correct option & complete the sentences (Any Three)

3

- The characteristic configuration of Cr is _____
a) $[\text{Ar}] 3d^4 4s^2$ b) $[\text{Ar}] 3d^5 4s^1$ c) $[\text{Ar}] 3d^3 4s^2$ d) $[\text{Ar}] 3d^6 4s^0$
- The 5d series of transition elements comprises of _____ to _____.
a) Sc to Zn b) Y to Cd c) La to Lu d) Hf to Hg
- The highest oxidation state of chromium in its compounds is _____.
a) +4 b) +5 c) +6 d) +7
- Ni^{2+} ions with dimethyl glyoxime form a _____ coloured precipitate.
a) Blue b) Green c) Red d) Yellow
- Which of the following ligands is incorrectly named?
a) H_2O : aqua b) F^- : fluoro c) NH_3 : amine d) CN^- : cyano
- The oxidation state of manganese in KMnO_4 is.
a) +2 b) +4 c) +6 d) +7

(B) Attempt any One of the following. (Any One)

4

1. Explain the oxidation states of transition elements.
2. Define ligand and explain its types with examples.

Q.3 (A) Select the correct option & complete the sentences (Any Four)

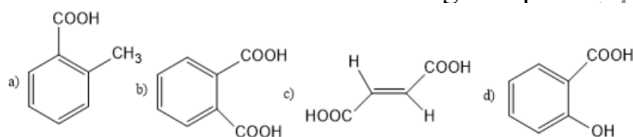
4

1. Strength of a carboxylic acid is increased by _____ groups and decreased by _____ groups.
a) Electron donating, electron withdrawing b) Alkyl, aryl
c) Electron withdrawing, electron donating d) Neutral, acidic
2. Carboxylic acid can be prepared from Grignard reagent by the action of _____
a) H_2 b) CO_2 followed by hydrolysis c) Alcohol d) halide
3. In nucleophilic acyl substitution, step-1 involves _____ and step-2 involves _____.
a) Protonation, deprotonation b) Formation of tetrahedral intermediate, elimination
c) Free radical formation, termination d) Oxidation, reduction
4. Reduction of carboxylic acids to primary alcohols is commonly carried out using _____.
a) $NaBH_4$ b) $KMnO_4$ c) $LiAlH_4$ d) PCC
5. Diborane (B_2H_6) reduces carboxylic acids to _____.
a) Aldehydes b) Ketones c) Primary alcohols d) Alkanes
6. Salt formation reaction of carboxylic acid involves reaction with _____.
a) Alcohol b) Aldehyde c) Base d) Ester

(B) Attempt any One of the following. (Any One)

4

1. Give IUPAC name to following compound



2. Explain the effect of substituents on the acidic strength of aliphatic and aromatic carboxylic acids.

Q.4 (A) Select the correct option & complete the sentences (Any Three)

3

1. In precipitation gravimetry, _____ precipitate is / are formed.
a) Only crude b) Only gelatinous c) Both crude and gelatinous d) Only colloidal
2. Q-test is used for _____.
a) Testing of significance b) To calculate confidence limit
c) Rejection of doubtful result d) Determination of pH
3. Wavelength range of visible region is approximately:
a) 2000–6000 Å b) 3000–7000 Å c) 4000–8000 Å d) 1000–3000 Å
4. A detector transforms change in physical or chemical properties of analyte into:
a) Electric signal b) Sound c) Light d) Heat
5. According to 2.5d rule, the criteria to retain doubtful result is _____.
a) $d_{\text{doubt}} = 2.5d_{\text{ave}}$ b) $d_{\text{doubt}} > 2.5d_{\text{ave}}$ c) $d_{\text{doubt}} < 2.5d_{\text{ave}}$
d) $d_{\text{doubt}} = 0$
6. Colorimetry concern with _____ region of spectrum
a) UV b) visible c) IR d) NMR

(B) Attempt any One of the following. (Any One)

4

1. Discuss analytical instrumental methods based on optical interaction.
2. Calculate the mean and median for the following data sets:

Set 1: 6.10, 6.12, 6.14, 6.10, 6.14, 6.12 Set 2: 18.30, 18.38, 18.32, 18.27, 18.28

Anjuman Islam Janjira Degree College of Science, Murud Janjira