

IV Semester B.Sc. Examination, May/June 2018
(CBCS) (2015-16 and Onwards)
(Fresh + Repeaters)
CHEMISTRY - IV

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) The question paper has **two** Parts. Answer both the Parts.
2) Draw diagrams and write chemical equations **wherever** necessary.

PART - A

Answer **any eight** of the following. Each question carries **two** marks : (8×2=16)

- State the condensed phase rule and indicate the terms.
- Mention the number of phases in the following systems :
 - $\text{CaCO}_3(\text{s}) \longrightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
 - $2 \text{KClO}_3(\text{s}) \longrightarrow 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$
- State law of constancy of interfacial angles.
- Name any two chemical and biological impurities present in water.
- Complete the following nuclear reactions.
 - ${}_4\text{Be}^9 + {}_1\text{H}^2 \longrightarrow {}_5\text{B}^{10} + \dots\dots\dots$
 - ${}_{12}\text{Mg}^{24} + {}_1\text{H}^2 \longrightarrow \dots\dots\dots + 2\text{He}^4$
- Define mass defect.
- What is tempering of steel ? Mention its effect on property of steel.
- Give the reaction of acetone with hydroxylamine.
- Explain Aldol condensation with an example.
- Write the structural formula of citric acid and give its basicity.



11. Explain Keto-enol tautomerism with an example.
12. What is photochemical smog ?

PART – B

Answer **any nine** of the following questions. **Each** question carries **six** marks : (9×6=54)

13. a) Explain the phase diagram of water system.
b) What are eutectic mixtures ? Give an example.
14. a) Derive Bragg's equation : $n\lambda = 2d \sin \theta$.
b) Write a note on smectic liquid crystals.
15. a) Draw a labeled phase diagram of Lead-Silver system. Identify the eutectic point. Give the composition at this point.
b) What are high temperature super conductors ? Give an example.
16. a) Describe the production of tungsten powder from Wolframite.
b) Write a note on hardness of water.
17. a) Distinguish between nuclear fission and nuclear fusion.
b) Write a note on radioactive carbon dating.
18. a) Write a neat diagram of a nuclear reactor and mention the role of coolant, control rods and moderators.
b) State Group displacement law.
19. a) Explain Iron-Carbon phase diagram.
b) Write a note on HVZ reaction.
20. a) Describe the manufacture of ferrosilicon.
b) How is nitriding of steel carried out ?
21. a) Explain the following reaction with mechanism knoevenagel condensation
b) Explain Rosenmund's reduction with an example.



22. a) Explain the mechanism of Perkin's reaction. (4+2)
b) Write Gattermann Koch aldehyde synthesis.
23. a) Describe the action of heat on the following : (4+2)
i) Oxalic acid
ii) Adipic acid.
b) Arrange the following in the increasing order of acid strength.
 CH_3COOH , Cl_2CHCOOH , ClCH_2COOH , Cl_3CCOOH .
24. a) How is diethyl malonate prepared from acetic acid ? (4+2)
b) How is butanone prepared from ethyl acetoacetate ? (4+2)
25. a) What are the causes for the depletion of ozone layer ? Give the remedial measures. (4+2)
b) What is Stone Leprosy ? (4+2)
26. a) Verify the law of reflection for spherical wave front at a plane surface using Huygen's principle. (3+5)
27. a) What are coherent sources ? (2)
b) Derive an expression for displacement of fringes when a thin sheet of transparent material is introduced in the path of one of interfering waves in a double slit experiment. (4)
28. a) What is zone plate ? What are positive and negative zone plates ? (2+4)
b) Derive an expression for focal length of zone plate. (4)
29. a) Give any two differences between prism spectrum and grating spectrum. (2+4)
b) Derive an expression for resolving power of plane transmission grating. (4)
30. a) Explain spontaneous and stimulated emission of radiation. (2+4)
b) Mention any two properties and two applications of laser. (4)
31. a) What are reflecting plates ? (2)
b) Give the theory of production of circularly and elliptically polarised light. (2+6)