Reg. No. : .....

Name : .....

Code No. 2016

SECOND YEAR
SAY/IMPROVEMENT
JUNE 2018

Time : 2 Hours
Cool-off time : 15 Minutes

Part – III

CHEMISTRY

Maximum : 60 Scores

General Instructions to Candidates :

- There is a 'Cool-off time' of 15 minutes in addition to the writing time.
- Use the 'Cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

Answer all questions from 1-7. Each question carries 1 score. **(7 × 1 = 7)**

1. If N spheres are there in a close packing, what is the total number of tetrahedral and octahedral voids present in it ?

2. What is the order of a reaction, if its half life is independent of initial concentration ?

3. What is the magnetic moment of an atom having d^{10} configuration ?

4. Gabriel synthesis is used for the preparation of which type of amines ?

   (i) Primary

   (ii) Secondary

   (iii) Tertiary

   (iv) Quaternary

5. Which vitamin is responsible for blood clotting ?

6. Name the linear polymer formed during the condensation polymerization between phenol and formaldehyde.

7. Which is the chemical substance discovered by Paul Ehlrich for the treatment of syphilis ?

Question from 8 to 20 carry 2 score each. Answer any 10 questions. **(10 × 2 = 20)**

8. Draw the vapour pressure-mole fraction curve for a non-ideal solution having positive deviation, if A and B are the two volatile components.

9. Calculate the depression in freezing point of a 0.2 molal solution if kg for water is 1.86 K kg mol^{-1}.

10. Suppose you are given a sample of NaCl salt. How will you prepare chlorine gas in laboratory using the above sample ? (Write balanced chemical equations)

11. Give one use each of Freon 12, DDT, CCl_4 and CHI_3.

12. Write equations showing Wurtz-Fittig reaction and Fittig reaction.

13. Identify A and B in the following equations :

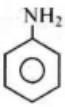
(a) $H - CHO + H - CHO \xrightarrow[\Delta]{\text{Con. KOH}} A + B$

(b) $2\,CH_3 - CHO \xrightleftharpoons{\text{dil. NaOH}} A \xrightarrow[-H_2O]{\Delta} B$

14. How the conversion of carbon dioxide to carboxylic acid can be effected using Grignard reagent ?

15. Complete the following equations :

(a) $R - NH_2 + CHCl_3 + 3\ KOH \xrightarrow{heat} ?$

(b)  $\xrightarrow{Con : H_2SO_4}$?

16. Describe primary and secondary structure of proteins.

17. Explain homopolymers and copolymers with examples.

18. Briefly explain different types of artificial sweetening agents.

19. Write the IUPAC names of the following compounds :

(a) $[Ni(CO)_4]$

(b) $K_3[Fe(C_2O_4)_3]$

20. Distinguish Ferromagnetism and Ferrimagnetism.

Questions from 21 to 29 carry 3 score each. Answer any 7 questions. **(7 × 3 = 21)**

21. Silver atoms are arranged in CCP lattice structure. The edge length of its unit cell is 408 pm. Calculate the density of silver.

(Atomic mass of silver is 108.4)

22. The rate of a reaction quadruples when the temperature changes from 293 K to 313 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature.

23. Explain any three chemical methods for the preparation of Lyophobic colloids with suitable examples.

24. Explain the following refining processes :

    (a) Distillation

    (b) Vapour phase refining

    (c) Zone refining

25. A solution of $CuSO_4$ is electrolysed for 20 minutes with a current of 1.5 amperes. What is the mass of copper deposited at cathode ?

    (Atomic mass of copper – 63)

26. Briefly explain the manufacture of sulphuric acid by contact process.

27. Explain with the help of equations, preparation of Xenon fluorides.

28. Describe lanthanoid contraction. Write any two consequences of it.

29. How the conversion of an aldehyde to acetal can carried out ?

    (Write chemical equations)

Questions from 30 to 33 carry 4 score each. Answer any 3. **(3 × 4 = 12)**

30. Predict the products of electrolysis of the following substances at anode and cathode using suitable chemical equations.

    (a) Aqueous NaCl

    (b) H_2SO_4 solution

31. Draw a diagram depicting crystal field splitting in an octahedral environment of d-orbitals. Label the diagram properly. Calculate the crystal field stabilization energy for a d^3 configuration.

32. (a) Predict the products A and B.

$$3CH_3 - CH = CH_2 + (H - BH_2)_2 \longrightarrow A \xrightarrow{H_2O_2/OH^-} B$$

    (b) How methanol is prepared industrially ?

33. (a) Symbolically represent standard hydrogen electrode, when it acts as an anode and as cathode.

    (b) Write Nernst equation for a Daniel cell.

    (Assume activity of metals is unity).
