PG/IVS/CEM/404/25

M.Sc. 4th Semester Examination, 2025

CHEMISTRY

(*Inorganic Spl.-Physical / Organic Spl.-Food*)

PAPER – CEM-404 (A&B)

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP–A

(**Inorganic Spl. Paper :** *Physical*)

1. Answer any *four* questions : 2×4

(*a*) Write down the name and structure of antidote of arsenic poisoning.

(*b*) What is the effect of Ca^{2+} on the absorption of dietary Pb^{2+} ?

(*c*) In what sense is cadmium a cumulative poison ?

(*d*) How blood-brain barrier is affected by mercury ?

(*e*) Why arsenate replaces phosphate in DNA ?

(*f*) Why glass lenses cannot be used in electron microscope ?

2. Answer any *four* questions : 4×4

(*a*) What type of radicals are formed during the metabolic conversion of Oxygen ? Write down the reaction mechanism of peroxidation of unsaturated fat by hydroxyl radical.

(*b*) How does the CN^- deprive the body from getting the Oxygen ? What is the receptor with which CO molecule reacts ?

(*c*) What are the chronic toxicological effects of benzene ? What kind of blood abnormalities are caused by benzene exposure ? How does benzene toxicity affect white cell count ? How does it affect bone marrow ?

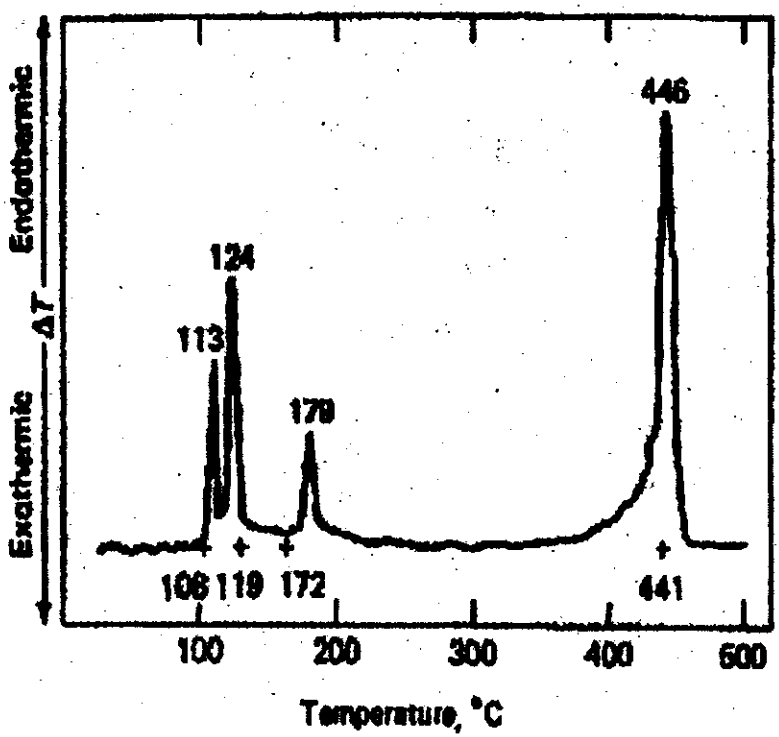
(*d*) Write down the toxic effects of formal dehyde and formalin.

(*e*) What are the basic differences between 'electron microscope' and 'optical microscope' ? What is the relation between the 'limit of resolution', 'numerical aperture' and wavelength of the light used ?

(*f*) What are the advantages (with examples) of AFM over the other conventional microscopic techniques ?

Answer any *two* questions : 8×2

3. (*a*) Differential scanning calorimetry (DSC) thermogram of a sulphur is shown below



Explain the origin of these peaks with suitable explanation.

(*Continued*)

(*b*) How heat capacity (Cp) can be calculated from the DSC plot ?

4. (*a*) What is Isothermal titration calorimetry (ITC) ? What is the scope of ITC ?

(*b*) How DLS works ? Write down the correlation function of mono disperse and poly disperse particles.

5. What do you mean by the term "chain melting temperature" for a membrane bilayer ? How can you measure the chain melting temperature by DSC studies ? How can you obtain a solvent spread monomolecular film ? What is the typical height difference between an organized lipid monolayer with respect to its surrounding fluid region ?

6. Write short note on the fluid mosaic model of cell membrane. Describe the transport of lipid across the membrane with the help of flippage protein.

[Internal Assessment – 10 Marks]

GROUP–B

(Organic Spl. Paper : *Food*)

1. Answer any *four* questions : 2 × 4

   (*a*) What is toned milk ?

   (*b*) What is hydrogenated fat ? Is it better than non-hydrogenated fat ?

   (*c*) What is food adulteration ?

(*d*) Write the difference between food adulteration and food additives.

(*e*) Write down the health benefits of Omega 3 fatty acids. Give an example.

(*f*) What are the consequences of deficiency of fat & excess of fat in diet ?

Or

What are the main differences between pre-hervest and post-harvest changes in fruits and vegetables ?

2. Answer any *four* questions : 4 × 4

(*a*) (*i*) Discuss the benefits of eating fruits and vegetables.

(*ii*) Write down the causes of degradation of nutritional value of fruits and vegetables.

(*b*) What is fruit processing ? Discuss its importance.

(*c*) (*i*) What is Cholesterol ?

(*ii*) Define LDL and HDL ?

Or

What are 'good cholesterol' and 'bad cholesterol' ?

(*d*) (*i*) What do you mean by Saponification ?

(*ii*) What is Iodine value ?

(*e*) (*i*) What are essential fatty acids ? Give examples.

(*ii*) What are Winterization, Bleaching and Deodorization ?

(*iii*) What are fermented and non-fermented processes during fruit processing ?

(*f*) (*i*) How Argemone oil can be detected in adulterated Mustard oil ?

(*ii*) How starch can be detected in milk ? What is Babcock test ?

3. Answer any *two* questions : 8×2

(*a*) (*i*) Write down the nutrients present in cereals.

(*ii*) What is the difference between Brown Rice and White Rice ?

(*iii*) Discuss the process of Wheat Milling.

(*iv*) Discuss briefly the manufacturing processes of bread and biscuit. 2×4

(*b*) (*i*) What do you mean by Dairy Products ?

(*ii*) What is Dairy Technology ?

(*iii*) What is Pasteurization of milk ? Describe various types of Pasteurization techniques. $2 + 2 + 4$

(*c*) (*i*) What determines the quality of milk ?

(*ii*) What is Standardization of milk ?

(*iii*) What do you mean by Cream Separation ?

(*iv*) What is Lactose Intolerance ? 2×4

(*d*) (*i*) What are the agencies set up by Government of India to remove adulterants from food ?

(*ii*) Write their roles in brief. 8

[Internal Assessment — 10 Marks]