MCQ 50 marks

1. **A.** 4
Explanation: Here, number of P atoms on the right side = $3 \times 2 = 6$
Number of P atoms on the left side = $2 + x$
So, $2 + x = 6$
Therefore, $x = 4$
Check: H atoms on the left = $3 \times 4 = 12$ and on the right = $3 \times 4 = 12$

2. **B. i and ii**
Explanation: Carbohydrates and fats are oxidised in the body and supply energy.

3. **A. In the meat**
Explanation: Bacterial growth is inhibited when pH < 4.5, while it occurs easily when pH > 4.5.
Here, the pH of the meat = 6.2 > 4.5
So, bacterial spoilage will occur faster in the meat.

4. **A. lack of O_2 prevents aerobic microorganisms from growing**
Explanation: After de-aeration, no O_2 remains in the food.
As a result, oxidation of the food and the multiplication of aerobic microorganisms are inhibited.

5. **D. Mould → Yeast → Bacteria**
Explanation: Mould needs $a_w > 0.8$
Yeast needs $a_w > 0.88$
Bacteria need $a_w > 0.9$
So, as a_w increases, the order of growth is Mould → Yeast → Bacteria.

6. **B. i and ii**
Explanation: Enzymes remain inactive at low temperature.
Water turns into ice, so a_w decreases and microorganisms cannot grow.
Therefore, i and ii are correct.

7. **A. Ethyl formate**
Explanation: Ethyl formate ($HCOOC_2H_5$) is an artificial antimicrobial agent, not a natural preservative.

8. **D. Calcium propanoate**
Explanation: Calcium propanoate prevents mould growth in bread, cake, biscuits, etc.

9. **B. Salt and sugar**
Explanation: Salt and sugar are the oldest food preservatives.

10. **D. By keeping the food moisture-free and lowering a_w**
Explanation: Mustard oil keeps the food moisture-free, so a_w stays low.
Microorganisms cannot multiply in a moisture-free environment.

11. **D. it is more soluble in water**
Explanation: Sodium benzoate is more soluble in water than benzoic acid.
In solution it is converted to benzoic acid, which acts as the antimicrobial agent.

12. **D.** 0.5
Explanation: Let the total meat required be m g
Given, $\frac{0.36}{m} \times 10^6 = 120$
$m = \frac{0.36 \times 10^6}{120} = 3000\,g = 3.0\,kg$
So, the meat to be added = $3.0 - 2.5 = 0.5\,kg$

13. **A.** 0.25%
Explanation: Generally 0.25% citric acid (or sodium benzoate or nitrate-nitrite salts) is added to the canning liquid.

14. **D.** 300 ppm**; within the permitted limit**
Explanation: Citric acid level in the jelly = $\frac{0.24}{800} \times 10^6 = 300\,ppm$
Since 200 < 300 < 350, the level is within the permitted limit.

15. **B.** $C_6H_8O_2$
Explanation: Sorbate salts hydrolyse to give sorbic acid (hexa-2,4-dien-1-oic acid).
Its structure is $CH_3 - CH = CH - CH = CH - COOH$, so the molecular formula is $C_6H_8O_2$.

16. **A.** 74
Explanation: Ethyl formate is $HCOOC_2H_5 = C_3H_6O_2$

Molecular mass = $3 \times 12 + 6 \times 1 + 2 \times 16 = 74$

17. **B. Pure ethanoic acid**
Explanation: Vinegar prepared from pure ethanoic acid is called white vinegar.

18. **B. Sulphite salt — oxygen-absorbing antioxidant**
Explanation: Sulphite salts absorb the O_2 present in food and prevent oxidation, so they are oxygen-absorbing antioxidants.

19. **D. i, ii and iii**
Explanation: The compound is lawsone (2-hydroxy-1,4-naphthoquinone), the main dye of henna leaves.
Here, C = 10, H = 4 (ring) +1 (on C_3) +1 (in −OH) = 6, O = 3, so the molecular formula is $C_{10}H_6O_3$.
There are two C = O groups, at C_1 and C_4.
Therefore, all three statements i, ii and iii are correct.

20. **C. Propan-1-ol**
Explanation: Propyl gallate, $C_6H_2(OH)_3 - COO - CH_2CH_2CH_3$, is an ester.
On hydrolysis it gives gallic acid and $CH_3CH_2CH_2OH$ (propan-1-ol).

21. **B. BHA**
Explanation: Rancidity is caused by oxidation of fat, so an antioxidant is needed.
BHA and BHT are antioxidants used to preserve oily and fatty foods.

22. **C. Lipid hydroperoxide**
Explanation: $L - O - O^{\cdot} + L - H \rightarrow LOOH + L^{\cdot}$
Here, the unstable compound LOOH formed is lipid hydroperoxide.

23. **C.** 6.72
Explanation: EDTA is a hexadentate ligand, so metal ion : EDTA = 1 : 1
Molar mass of $C_{10}H_{14}N_2Na_2O_8 = 120 + 14 + 28 + 46 + 128 = 336\ gmol^{-1}$
Moles of EDTA required = 0.02 mol
So, mass = $0.02 \times 336 = 6.72$ g

24. **D.** Cu^{2+}
Explanation: Ions of transition metals (such as Fe^{2+}, Fe^{3+}, Cu^{2+}, Co^{3+}, Ni^{2+}) act as catalysts in the redox reactions of oils and fats.

25. **C.** 35°C
Explanation: In the presence of acetobacter, ethanol is oxidised to ethanoic acid at 35°C.
$CH_3CH_2OH + O_2 \rightarrow CH_3COOH + H_2O$

26. **A.** 8
Explanation: Balanced reaction:
$2C_6H_{12}O_6 \rightarrow 4C_2H_5OH + 4CO_2$
Here, x = 4 and y = 4
So, x + y = 8

27. **D. Hot packing**
Explanation: Filling the food into cans while it is still hot after blanching is called hot packing.

28. **B. i and iii**
Explanation: Vinegar contains 6% to 10% CH_3COOH and 90% to 94% water.
Its pH ranges from about 2.2 to 2.73, with an average pH ≈ 2.5.
Therefore, i and iii are correct.

29. **B. Highly acidic food, e.g. tomato**
Explanation: Highly acidic foods (pH ≤ 4.6), such as tomatoes and sour fruits, are canned by the boiling water bath method.

30. **C. Blanching → Filling into cans → Adding canning liquid → Exhausting and sealing → Retorting**
Explanation: Second stage: Blanching → Filling into cans → Adding canning liquid
Third stage: Exhausting and sealing → Retorting → Cooling, labelling and storing
So, the correct sequence is Blanching → Filling into cans → Adding canning liquid → Exhausting and sealing → Retorting.

31. **A. Uneven collisions with molecules of the dispersion medium**
Explanation: Molecules of the dispersion medium continuously strike the colloid particles unevenly.
As a result, the particles move in a zigzag path, which is called Brownian motion.

32. **D. liquid and gas**
Explanation: Fog is a liquid aerosol.
The dispersed phase is liquid (tiny water droplets) and the dispersion medium is gas (air).

33. **A.** 17 : 22
Explanation: Reaction: $2NH_3 + CO_2 \rightarrow NH_2CONH_2 + H_2O$
Mass of $NH_3 = 2 \times 17 = 34$ g and mass of $CO_2 = 44$ g
So, mass ratio = 34 : 44 = 17 : 22

34. **B. It is a suspension; a sediment settles on standing**
Explanation: A mixture is a suspension when the particle diameter is > 500 nm.
Here, 750 nm > 500 nm
A suspension is an unstable mixture, so the particles settle as a sediment on standing.

35. **B. Their negative charge is neutralised by H^+ and they coagulate**
Explanation: Casein particles are negatively charged colloids.
The H^+ of lactic acid neutralises the negative charge on the particles.
The particles then aggregate into lumps (curd); this is called coagulation.

36. **D.** CO
Explanation: Synthesis gas is a mixture of CO and H_2 ($CO + 3H_2$).
Producer gas is a mixture of CO and N_2 ($2CO + N_2$).
So, the common component is CO.

37. **C.** 25
Explanation: Heat obtained from the coal = $1.5 \times 12000 = 18000$ BTU
Temperature rise = $\frac{18000}{400} = 45°F$
So, the rise in °C = $45 \times \frac{5}{9} = 25°C$

38. **A. it corrodes the SiO_2 of glass**
Explanation: The main component of glass is SiO_2.
$SiO_2 + 2NaOH \rightarrow Na_2SiO_3 + H_2O$
So NaOH corrodes glass and is therefore not used in glass cleaner.

39. **A.** 1098.2
Explanation: Amount of CaO in the cement = $1000 \times 0.615 = 615$ kg
$CaCO_3 \rightarrow CaO + CO_2$; 100 kg of $CaCO_3$ gives 56 kg of CaO
So, $CaCO_3$ required = $615 \times \frac{100}{56} = 1098.2$ kg

40. **B.** 2
Explanation: Reaction: $2Na_2SO_4 + 2SiO_2 + C \rightarrow 2Na_2SiO_3 + CO_2 + 2SO_2$
So, 1 mol of C produces 2 mol of SO_2.

41. **C.** CoO
Explanation: Adding CoO during glass making gives blue-coloured glass.

42. **B.** $K_2O \cdot Al_2O_3 \cdot 6SiO_2$
Explanation: The formula of potash feldspar is $K_2O \cdot Al_2O_3 \cdot 6SiO_2$.

43. **D.** 38 g**;** 1.5 mol
Explanation: Molar mass of $Cr_2(SO_4)_3 = 2 \times 52 + 3 \times 96 = 392$ gmol^{-1}
Moles = $\frac{98}{392} = 0.25$ mol, so $Cr^{3+} = 0.5$ mol
Reaction: $2[Cr(H_2O)_6]^{3+} \rightleftharpoons Cr_2O_3 + 9H_2O + 6H^+$
Moles of $Cr_2O_3 = 0.25$ mol, mass = $0.25 \times 152 = 38$ g
Moles of $H^+ = 0.5 \times \frac{6}{2} = 1.5$ mol

44. **C. Collagen**
Explanation: The main fibrous protein of raw hide is collagen.
Chromium compounds bind to collagen and make the leather durable.

45. **C.** $CaSO_3 + CO_2$
Explanation: On heating, limestone reacts with SO_2:
$CaCO_3 + SO_2 \xrightarrow{\Delta} CaSO_3 + CO_2$

46. **D. Liquid** NH_3
Explanation: Liquid NH_3 is a pollutant of the urea industry, not of the cement industry.

47. **C.** 5×10^{-8} m
Explanation: 5×10^{-8} m = $5 \times 10^{-8} \times 10^9$ nm = 50 nm
This lies between 1 and 100 nm, so it falls within the nano range.

48. **A. Peat**
Explanation: Peat has the lowest carbon content and the highest moisture, so its heating value is the lowest. Therefore, the low-grade coal is peat.

49. **B.** SiO_2
Explanation: The main raw materials for making ceramics are silica (SiO_2) and clay. Therefore, the correct answer is SiO_2.

50. **D.** 46.67%

Explanation: The formula of urea is $CO(NH_2)_2$

Here, molar mass = 12 + 16 + 2(14 + 2) = 60

and, mass of nitrogen = 2 × 14 = 28

So, percentage = $\frac{28}{60} \times 100$

Therefore, the amount of $N_2 \approx 46.67\%$