



Name :
Roll No. :
Invigilator's Signature :

CS/B.TECH(FT-OLD)/SEM-4/FT-401/2012

2012

CHEMISTRY OF FOODS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) The major structural polysaccharide in animals is
- | | |
|-------------|-------------------|
| a) starch | b) cellulose |
| c) glycogen | d) none of these. |
- ii) The approximate water activity level of foods at which bacterial growth starts is
- | | |
|--------|---------|
| a) 0.4 | b) 0.6 |
| c) 0.8 | d) 1.0. |

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- Diagram illustrating the structure of a linear galacturonan chain. The main chain is labeled "Linear galacturonan" and is shown as a horizontal line. Branches are labeled "Side-chain" and are shown as lines extending from the main chain. One branch is specifically labeled "Rhamnogalacturonan".

- a) Cellulose b) Pectin
- c) Cyclodextrin d) None of these.
- vii) Which one of the following is an essential amino acid ?
- a) Proline b) Aspartic acid
- c) Serine d) Leucine.



viii) Cereals are limiting in which of the following two essential amino acids ?

- a) Lysine and threonine
- b) Lysine and arginine
- c) Threonine and arginine
- d) Threonine and proline.

ix) Which one of the following is not a part of Maillard browning reaction ?

- a) Amadori rearrangement
- b) Strecker degradation
- c) Caramelization
- d) Formation of glycosyl amine.

x) What is the name of the following equation ?

$$\frac{d(\ln a_w)}{d(1/T)} = -\frac{Q_s}{R}$$

$\ln a_w \Rightarrow$ Natural logarithm of water activity

$Q_s \Rightarrow$ Heat of adsorption

$T \Rightarrow$ Absolute temperature

$R \Rightarrow$ Universal gas constant.

- a) Arrhenius equation
- b) Raoult's law
- c) Clausius-Clapeyron equation
- d) none of these.

xi) Among the following four sugars, which one has the highest tendency of crystallization ?

- a) Sucrose
- b) Lactose
- c) Glucose
- d) Fructose.

- 4018(O)



GROUP – B

(Short Answer Type Questions)

Answer the following questions.

3 × 5 = 15

2. The hydrogen bonds that exist between water molecules are stronger than most other hydrates. Draw the picture of intramolecular covalent bonds and intermolecular hydrogen bonds in water and explain this unique hydrogen bond strength in water, compared to the other hydrates.
3. Draw a graph showing sorption isotherm phenomena and explain the terms 'desorption', 'adsorption' and 'hysteresis', labelling them on the graph.
4. Hydrolysis of sucrose results in *D*-glucose and *D*-fructose. The mixture of these two monosaccharides is called 'invert sugar'. Explain why. What is the most abundant ketose in nature ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.

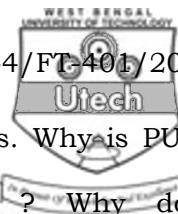
3 × 15 = 45

5. What is hydrogenation of fat and why is it done ? Explain the formation of *trans* isomers from *cis* isomers of partially hydrogenated lipids using an example reaction scheme. Give the range of oil uptake (in % by weight of food) in fried foods during deep frying.

4 + 9 + 2



6. Why is the Browning reaction important in Food processing industry ? Give two industrial applications of non-enzymatic browning reaction. What changes occur during Browning reaction ?
5 + 5 + 5
7. What is Rancidity ? Is it similar with the term 'reversion' ? What measures are to be taken to prevent rancidity during storage ? What are the chemical changes which occur during storage of vegetable oil ?
2 + 2 + 6 + 5
8. Write down three factors affecting auto-oxidation of lipids. Describe briefly the three subsequent stages of auto-oxidation of lipids. Give the full names of the antioxidants BHA, BHT and TBHQ. Also explain how antioxidants retard auto-oxidation of lipids.
3 + 6 + 3 + 3
9. Explain the two major reasons why casein is resistant to heat destruction compared to most other food proteins. Draw a schematic diagram of myofibril structure of muscle protein, label the thick and thin filaments, and explain its cross-striated structure.
7 + 8



10. a) Differentiate between oil, fat and waxes. Why is PUFA considered as essential fatty acid ? Why does Arachidonic acid belong to omega-6 while linolenic acid to omega-3 families of fatty acids ?
- b) Define saponification value and iodine value. What are their significance ? What is the chemical significance of hydrogenation of oil ? What is reversion of oil ? How rancidity can be checked and prevented ?

3 + 2 + 2

2 + 2 + 2 + 1 + 1

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