

ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.

Ph.D. (FOOD SCIENCE AND NUTRITION)

COURSE CODE : 152

Register Number :

Signature of the Invigilator
(with date)

COURSE CODE : 152

Time : 2 Hours

Max : 400 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each of the question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you -1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. A triglyceride consists of
 - (A) Three glycerols attached to a lipid
 - (B) Three fatty acids attached to a glucose
 - (C) Three fatty acids attached to a glycerol
 - (D) Three phospholipids attached to a cholesterol

2. The common intermediate of carbohydrate, protein and lipid metabolism is
 - (A) Ammonia
 - (B) Pyruvic acid
 - (C) Acetyl Co A
 - (D) Phosphoglyceraldehyde

3. Metabolism of triglyceride utilizes
 - (A) Glycolysis
 - (B) Beta-oxidation
 - (C) The Krebs cycle
 - (D) All of the above

4. The difference between cis- and trans-fatty acids is
 - (A) The number of double bonds
 - (B) The length of their carbon chains
 - (C) The location of the first double bond
 - (D) The configuration around the double bond

5. The primary energy source of resting skeletal muscles is/are
 - (A) Lactic acid
 - (B) Ketone bodies
 - (C) Glucose
 - (D) Fatty acids

6. Which of the following is not true? Lecithin is
 - (A) An emulsifier
 - (B) A phospholipid
 - (C) An essential nutrient
 - (D) A constituent of cell membranes

7. A lack of blood glucose would have the greatest effect on
 - (A) The brain
 - (B) The heart
 - (C) The liver
 - (D) Skeletal muscles

8. Amino acid metabolism involves all of the following except
(A) Oxidative deamination (B) Transamination
(C) The Krebs cycle (D) Beta oxidation
9. The essential fatty acids include
(A) Stearic acid and oleic acid
(B) Oleic acid and linoleic acid
(C) Palmitic acid and linolenic acid
(D) Linoleic acid and linolenic acid
10. The product of beta oxidation is metabolized by the actions of
(A) Glycolysis (B) The Krebs Cycle
(C) Gluconeogenesis (D) The Cori Cycle
11. Glycogen stored in which of the following tissues can be used to produce free glucose?
(A) Liver (B) Heart
(C) Skeletal muscle (D) All of the above
12. Transport vehicles for lipids are called
(A) Micelles (B) Lipoproteins
(C) Blood vessel (D) Monoglycerides
13. Which of the following is not true of the Krebs cycle?
(A) Three molecules of NADH are produced per molecule of glucose
(B) Two molecules of FADH₂ are produced per molecule of glucose
(C) Addition of acetyl coa to oxaloacetic acid starts the cycle
(D) GTP is produced and converted to ATP
14. The lipoprotein most associated with a high risk of heart disease is
(A) CHD (B) HDL
(C) LDL (D) VLDL
15. Lactic acid
(A) Is produced as a result of aerobic metabolism of glucose
(B) Is one of the normal end products of glycolysis
(C) Is a common end product of red blood cells
(D) None of the above

16. What is the meaning of the statement "a reduced fat peanut butter Represents an O/W emulsion, in which one phase is the continuous phase, And the other is the dispersed phase"?
- (A) In reduced fat peanut butter, water is the dispersed phase
 - (B) After grinding peanuts, a stable emulsion results, one that will not separate
 - (C) There is only one phase in reduced fat peanut butter
 - (D) In reduced fat peanut butter, water is the continuous phase
17. Glycolysis
- (A) Requires the presence of oxygen
 - (B) Is the first step of cellular respiration
 - (C) Utilizes FAD as an electron acceptor
 - (D) None of the above
18. Consider the fact that linoleic acid is C18:2, while stearic acid is C18:0. All Else equal, which fatty acid should have the higher melting point?
- (A) Linoleic, because it is unsaturated
 - (B) Stearic, because it has more carbon
 - (C) Stearic, because it is unsaturated
 - (D) Stearic, because it is saturated
19. Aflatoxin is produced by
- (A) *Aspergillus* sp.
 - (B) *Salmonella* sp.
 - (C) *Fusarium* sp.
 - (D) *Streptococcal* sp
20. Which statement about metabolic reactions is FALSE?
- (A) Breakdown of fats into fatty acids and glycerol is an example of an catabolic reaction
 - (B) Peptide synthesis from amino acids represents an anabolic reaction
 - (C) Conversion of maltose into glucose is an example of an catabolic reaction
 - (D) Anabolic reactions are important during digestion and absorption of food
21. The major carrier of salmonellosis are
- (A) Meat and eggs
 - (B) Meat and fish
 - (C) Eggs and fish
 - (D) Eggs and fruits

22. Consider the following food colloidal systems. Which one shows the Incorrect dispersed/continuous phase?
- (A) Foam G/L (B) Emulsion L/S
(C) Gel L/S (D) Sol S/L
23. Salmonellosis involves
- (A) An enterotoxin and exotoxin
(B) An enterotoxin and cytotoxin
(C) An exotoxin and cytotoxin
(D) A cytotoxin only
24. Which choice correctly matches food proteins with the correct food source?
- (A) Actin/red meat; avidin/egg white; casein/milk; collagen/red meat; lactoferrin/milk; lipoxigenase/soybean
(B) Avidin/red meat; lipoxigenase/egg white; whey/milk; collagen/red meat; lactoferrin/milk; casein/soybean
(C) Myosin/red meat; whey/egg white; casein/milk; collagen/red meat; avidin/milk; lipoxigenase/soybean
(D) Choices (A) and (C)
25. Which of the following statements are true regarding Staphylococcus food Poisoning
- (A) Is an enterotoxin
(B) Causes gastroenteritis
(C) Is produced by Staphylococcus aureus
(D) All of these
26. Which statement is true?
- (A) The physical state of water depends on the motion of oxygen molecules
(B) Water molecules in steam are more closely aligned than in ice
(C) The physical state of water depends on the motion of H₂O molecules
(D) Water molecules in liquid water are more closely aligned than in ice
27. *Clostridium perfringens* toxin is an
- (A) Exotoxin produced during vegetative growth
(B) Enterotoxin produced during sporulation
(C) Endotoxin produced during vegetative growth
(D) Enterotoxin produced during vegetative phase

28. You are working to develop a new soy infant formula. The 2 key amino acids Required to be present in adequate amounts for infants are cysteine (cys) And methionine (met). Analysis of your formulation shows 3.98 mg of cys + Met per gram of protein present in your product. What should you Conclude?
- (A) Your formulation provides an adequate amount of these two nutrients
 - (B) Your formulation does NOT provide an adequate amount of these two nutrients
 - (C) There is insufficient data provided to answer this question
 - (D) These nutrients are not essential in the infant formula
29. *Clostridium perfringens* poisoning is mostly associated with the consumption of
- (A) Meat products
 - (B) Vegetables
 - (C) Canned foods
 - (D) Fish products
30. Two sugars differing only in configuration around one specific carbon atom are called
- (A) Anomer
 - (B) Epimer
 - (C) Isomers
 - (D) Conformers
31. Botulism prevention involves
- (A) Proper heat sterilization before food canning
 - (B) Addition of chemical preservatives
 - (C) Proper low temperature treatment before food canning
 - (D) All of the above
32. Cheese _____
- (A) Is formed from milk proteins that bond to each other when ph is lowered to ph 4.6
 - (B) Is made when milk proteins reach their isoelectric ph of ph 10
 - (C) Is a poor source of calcium and phosphorus compared to sour cream
 - (D) Is formed from acidified milk because the proteins repel each other at ph 4.6
33. Which of the following statements are true regarding botulinal toxin
- (A) Is a neurotoxin
 - (B) Water soluble exotoxin
 - (C) Is produced by *Clostridium botulinum*, a gram positive anaerobic bacteria
 - (D) All of these

34. In a(n) _____, the presence of two _____ creates a _____ at the interface between them
- (A) Banana; layers; seam
 (B) Gel; proteins; bond
 (C) Food matrix; carbon atoms; bond
 (D) Emulsion; phases; surface tension
35. Botulism is caused by
- (A) *Clostridium botulinum* (B) All *Clostridium* species
 (C) *Clostridium tetanai* only (D) *Clostridium subtilis* only
36. Which is the FALSE statement ?
- (A) In crystalline confectionery, the goal is to promote the formation of sugar crystals
 (B) A crystal forms when a group of sugar molecules collect around a nucleus
 (C) A nucleus is a limited aggregation of sugar molecules in a syrup solution
 (D) In the manufacture of gummy candies, it is desirable to generate many crystals
37. Common food poisoning microbes are
- (A) *Clostridium* and *Salmonella* (B) *Clostridium* and *E.coli*
 (C) *E.coli* and *Salmonella* (D) *Clostridium* and *Streptococcus*
38. This food scientist/technologist work area involves sampling raw products To ensure conformity to purchasing specifications
- (A) Product development (B) Experimentation
 (C) Quality control (D) Marketing
39. Which of the following statements are true about chemical preservatives
- (A) Microbicidal or microstatic agents
 (B) Chemical preservatives often hazardous to humans
 (C) Sodium benzoate is a widely used preservative
 (D) All of these
40. The average percentage of iron absorbed is higher for beef than for spinach,
 Which is an illustration of
- (A) Biological value (B) Brix
 (C) Bionutrient value (D) Bioavailability

41. Normally bacteria stop division
- (A) At 10 degree celcius (B) At 5 degree celcius
(C) At 0 degree celcius (D) At 20 degree celcius
42. Which statement regarding free radicals is true?
- (A) Free radicals injure cells, damaging the DNA, which creates the basis for disease
(B) Normal cell functions can produce a small percentage of free radicals
(C) Free radicals cannot affect fat molecules in foods
(D) Both (A) (B) and (C)
43. Pasteurization is a
- (A) Low temperature treatment
(B) Steaming treatment
(C) High temperature treatment
(D) Low and high temperature treatment
44. Which of the following statement is False?
- (A) Nitrogen equilibrium is when $N_{in} = N_{out}$
(B) Zero nitrogen balance is the same as nitrogen equilibrium
(C) Positive nitrogen balance is when $N_{in} > N_{out}$
(D) Positive nitrogen balance is when $N_{in} < N_{out}$
45. Food preservation involves
- (A) Increasing shelf life of food
(B) Ensuring safety for human consumption
(C) Both (A) and (B)
(D) None of these
46. Which is NOT an alternative sweetener?
- (A) Sugar alcohol (B) Maltodextrin
(C) Acesulfame - K (D) Sucralose
47. The undesirable change in a food that makes it unsafe for human Consumption is referred as
- (A) Food decay (B) Food spoilage
(C) Food loss (D) All of the above

48. In a _____ emulsion, water is the predominant or _____ phase (the solvent), while oil is the _____ phase (the solute). In a(n) _____ emulsion, the situation is opposite. _____ is the solvent, While _____ is the solute.
- (A) W/O, continuous, dispersed; O/W, oil, water
 (B) O/W, dispersed, continuous; W/O, oil, water
 (C) O/W, continuous, dispersed; W/O, water, oil
 (D) O/W, continuous, dispersed; W/O, oil, water
49. Which of the following is NOT an intrinsic factor in food spoilage?
- (A) pH (B) Moisture content
 (C) Available nutrients (D) Temperature
50. Which type of muscle fibers contain more mitochondria, rely on aerobic Metabolism, produce ATP energy more slowly, and are associated with Endurance athletics?
- (A) Slow twitch (B) Fast twitch
 (C) Type 1 (D) Both (A) and (B)
51. All the following processes occur rapidly in the membrane lipid bilayer except
- (A) Flexing of fatty acyl chains
 (B) Lateral diffusion of phospholipids
 (C) Transbilayer diffusion of phospholipids
 (D) Rotation of phospholipids around their long axes
52. Suppose you measure the obrix/acid ratio of the same type of fruit from two Suppliers (different parts of the country) and find supplier A = 7 and Supplier B = 11. What might you conclude regarding the flavor of the juice Manufactured from A vs. B?
- (A) Product B would be from Nagpur
 (B) They would have identical flavor
 (C) B is probably sweeter
 (D) B has a higher acid content

53. Which of the following phospholipids is localized to a greater extent in the Leaflet of the membrane lipid bilayer?
- (A) Choline phosphoglycerides
 - (B) Ethanolamine phosphoglycerides
 - (C) Inositol phosphoglycerides
 - (D) Serine phosphoglycerides
54. Which does not belong with the others?
- (A) Comminuted meat emulsion
 - (B) Myofibrillar proteins stabilize fat droplets
 - (C) Proteins contribute to the formation of a viscous gel matrix
 - (D) Viscous gel matrix stabilizes the emulsion by promoting fat globule movement
55. Which are the cholesterol esters that enter cells through the receptor- Mediated endocytosis of lipoproteins hydrolyzed?
- (A) Endoplasmin reticulum
 - (B) Lysosomes
 - (C) Plasma membrane receptor
 - (D) Mitochondria
56. In reduced _____ milk the enzyme _____ is added to react with the _____ sugar naturally present in milk. The _____ would be broken down by the _____ enzyme treatment to yield _____ and _____ which are sweeter than the _____ lactose
- (A) Lactose, lactase, lactose, lactose, lactase, glucose, galactose, monosaccharide
 - (B) Lactose, lactase, lactose, lactose, lactase, glucose, galactose, disaccharide
 - (C) Lactase, lactase, lactose, lactose, lactase, glucose, fructose, disaccharide
 - (D) Lactose, lactase, lactose, lactose, lactase, glucose, fructose, disaccharide
57. HDL is synthesized and secreted from
- (A) Pancreas
 - (B) Liver
 - (C) Kidney
 - (D) Muscle
58. Carbon-to-carbon bonds in food molecules (carbohydrates, proteins, fats) are
- (A) Covalent bonds
 - (B) Intermolecular bonds
 - (C) Ionic bonds
 - (D) Hydrogen bonds

59. Synthesis of prostaglandins is inhibited by
(A) Aspirin (B) Arsenic
(C) Fluoride (D) Cyanide
60. A serving of dosa has the following nutrient composition: 10 grams of fat, 2 grams of protein, 10 grams of water, and 15 grams of carbohydrate. Approximately how many calories (kcal) does it provide?
(A) 125 (B) 160
(C) 250 (D) 200
61. Milk is deficient of which mineral?
(A) Phosphorus (B) Sodium
(C) Iron (D) Potassium
62. Which statement regarding confectionery and chocolate is true?
(A) They contain no protein
(B) They contain identical amounts of key nutrients
(C) They provide zero kcal
(D) 100g of cocoa powder contains protein, calcium, potassium, and phosphorus
63. Milk is deficient in which vitamins?
(A) Vitamin C (B) Vitamin A
(C) Vitamin B2 (D) Vitamin K
64. Oxidation of which substance in the body yields the most calories
Glucose
(A) Glycogen
(B) Protein
(C) Lipids
(D) None
65. How is margarine different from butter?
(A) Margarine potentially has a higher unsaturated fat content
(B) A collagen molecule is composed of 3 amino acids in total
(C) It is an important myofibrillar protein
(D) Its physical structure and ability to form crosslinks contribute to toughness

66. Which of the following is required for crystallization and storage of the Hormone insulin?
- (A) Mn^{++} (B) Mg^{++}
(C) Ca^{++} (D) Zn^{++}
67. Carbohydrates are found in virtually all foods except
- (A) Milk (B) Meats
(C) Breads (D) Fruits
68. A drug which prevents uric acid synthesis by inhibiting the enzyme Xanthine oxidase is
- (A) Aspirin (B) Allopurinol
(C) Colchicine (D) Probenecid
69. Disaccharides include
- (A) Starch, glycogen, and fiber
(B) Amylose, pectin, and dextrose
(C) Sucrose, maltose, and lactose
(D) Glucose, galactose, and fructose
70. Proteins and macromolecular structures take on their higher order Structures
- (A) By self-assembly
(B) With the help of molecular chaperons
(C) With the help of precursor sequences that are removed from the final structures
(D) All of the above
71. The making of a disaccharide from two monosaccharides is an example of
- (A) Digestion (B) Hydrolysis
(C) Condensation (D) Gluconeogenesis
72. Which of the following is not a sensible grouping of amino acids based on Their polarity properties?
- (A) Ala, Leu, and Val (B) Arg, His, and Lys
(C) Phe, Trp, and Tyr (D) Asp, Ile and Pro

73. The storage form of glucose in the body is
(A) Insulin (B) Maltose
(C) Glucagon (D) Glycogen
74. The isoelectric point of an amino acid is defined as the pH
(A) Where the molecule carries no electric charge
(B) Where the carboxyl group is uncharged
(C) Where the amino group is uncharged
(D) Of maximum electrolytic mobility
75. The significant difference between starch and cellulose is that
(A) Starch is a polysaccharide, but cellulose is not
(B) Animals can store glucose as starch, but not as cellulose
(C) Hormones can make glucose from cellulose, but not from starch
(D) Digestive enzymes can break the bonds in starch, but not in cellulose
76. What is the heaviest of the twenty amino acids?
(A) Phenylalanine (B) Tryptophan
(C) Tyrosine (D) Histidine
77. The ultimate goal of carbohydrate digestion and absorption is to yield
(A) Fibers (B) Glucose
(C) Enzymes (D) Amylase
78. What is the end product of leucine metabolism?
(A) Acetyl-coa (B) Pyruvic acid
(C) Oxaloacetic acid (D) Acetyl carnitine
79. The enzyme that breaks a disaccharide into glucose and galactose is
(A) Amylase (B) Maltase
(C) Sucrase (D) Lactase

80. When the amino acid alanine (R-group is CH_3) is added to a solution with a Ph of 7.3, alanine becomes
- (A) A cation (B) Nonpolar
(C) A zwitterions (D) An isotope
81. With insufficient glucose in metabolism, fat fragments combine to form
- (A) Dextrins (B) Mucilages
(C) Phytic acids (D) Ketone bodies
82. The elements oxygen, nitrogen, and carbon
- (A) Can all form covalent bonds with other elements
(B) Contain protons and neutrons in their atomic nuclei
(C) Are common elements in the molecules that make up living organisms
(D) All of the above
83. What does the pancreas secrete when blood glucose rises? When blood glucose falls?
- (A) Insulin; glucagon (B) Glucagon; insulin
(C) Insulin; glycogen (D) Glycogen; epinephrine
84. The main difference between an acid and a base is that
- (A) Bases are polar molecules and acids are not
(B) Acids are polar molecules and bases are not
(C) Bases donate hydrogen ions in water while acids accept hydrogen ions
(D) Acids donate hydrogen ions in water while bases accept hydrogen ions
85. What percentage of the daily energy intake should come from Carbohydrates?
- (A) 15 to 20 (B) 25 to 30
(C) 45 to 50 (D) 45 to 65
86. Which of the following character does not apply to water?
- (A) The water molecule is asymmetric
(B) The water molecule readily forms hydrophobic interactions
(C) The covalent bonds in water are highly polarized
(D) All three atoms in the water molecule readily form hydrogen bonds

87. Which of the following organic groups are found in naturally occurring amino Acids?
- (A) Guanidinium ion (B) Indole
(C) Imidazole (D) All of these
88. The ph of a solution is determined by
- (A) Concentration of salt
(B) Relative concentration of acids and bases
(C) Dielectric constant of the medium
(D) Environmental effect
89. Polyprotic acids such as H_3PO_4 , can act as acid-base buffers
- (A) Only in combination with polyprotic bases
(B) If their concentration is kept low
(C) At ph values around neutrality
(D) At ph values around any of their pka's
90. Which symbol is used to represent a heating process in a food processing Flowchart?
- (A) O (B) ∇
(C) \square (D) \Rightarrow
91. Which of the following is most affected by high levels of ethylene?
- (A) Ripening of fruits (B) Rancidity of chesse
(C) Color change of meat (D) Microbial spoilage of brad
92. Which of the following best determines the suggested selling price of a Product?
- (A) The Break-Even point
(B) Cost and availability of raw materials
(C) Predicted price consumers are prepared to pay
(D) Recovery of production cost with no profit margin
93. Why are quality assurance systems used in food production ?
- (A) To promote product (B) To increase production
(C) To increase market share (D) To achieve consistency of products

94. Which feature of product is monitored by the critical control points of HACCP system ?
- (A) Size (B) Safety
(C) Nutrition (D) Consistency
95. In which of the following groups foods are produced by fermentation ?
- (A) Jam, honey, milk (B) Cheese, jams, pickles
(C) Honey, salami, Pickles (D) Cheese, yogurt, salami
96. What is the role of active scavenging sachet in active packaging ?
- (A) To absorb moisture, thus preventing mould growth
(B) To replace nitrogen content, thus preventing flavour changes
(C) To add carbon dioxide that extends product shelf-life
(D) To absorb undesirable gases that reduce product shelf-life
97. What is the main function of ascorbic acid when added to orange juice?
- (A) To enhance flavour (B) To extend shelf life
(C) To extend nutrient loss (D) To act as antioxidant
98. What is the temperature danger zone?
- (A) 60°F-160°F (B) 30°F-130°F
(C) 20°F-120°F (D) 40°F-140°F
99. According to the rule of thumb for leftovers, how many days can leftovers Remain in the refrigerator at 40°F or below?
- (A) 3 (B) 6
(C) 5 (D) 4
100. What is the process of heating liquids or food at high temperatures to Destroy food borne pathogens?
- (A) Food preservation (B) Irradiation
(C) High Pressure Processing (D) Canning