Total No. of Printed Pages: 21

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A

Ph.D./URS-EE-Jan-2022

SUBJECT: Food Technology

SET-Y

Sr. No. Total Questions : 10

| | | 51. NO |
|------------------------------|-----------------|--------------------------------|
| Time: 11/4 Hours | Max. Marks: 100 | Total Questions : 100 |
| Roll No. (in figures) | (in words) | |
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| , | The application of inter(s) in the image | didiyoto to . |
|------|---|---|
| | (1) to remove unwanted noise | |
| | (2) to sharpen the edges of objects | |
| | (3) Both above | |
| | (4) None of the above | |
| 2. | With most modern equipment, | gray lavels are available |
| | | gray levels are available. |
| | (1) 255 | (2) 256 |
| | (3) 251 | (4) 225 |
| 3. | In a typical image having dimensions integer value ranging: | of 512 pixels X 512 pixels, each pixel has an |
| | (1) From 100 to 1000 | (2) From 0 to 100 |
| | (3) From 0 to 255 | (4) From 0 to 521 |
| 4. | In binarization, the original gray level in | nage is changed from a continuum of: |
| | (1) Colours or gray levels into a black a | nd white image |
| | (2) Black and white levels into a colour | image |
| | (3) Black level into a colour image | |
| | (4) White level into a colour image | |
| 5. | The mechanism of elastic can be describ | ed by: |
| | (1) Einstein theory | (2) Rubber elasticity theory |
| | (3) Plastic resilience system | (4) None of the above |
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| | | |

| 6. | The ability of two materials to resist se | eparation after their surfaces come into contact is |
|--|---|---|
| | known as : | paramon are area survives come into contact 18 |
| | (1) Cohesion | (2) Tack |
| | (3) Adhesion | (4) Stickiness |
| 7. | Low values for the second | |
| | Low values for the surface energy of th | e solid means : |
| | (1) Low adhesion | (2) High adhesion |
| | (3) Low cohesion | (4) High cohesion |
| | | |
| 8. | Differential Scanning Calorimetry is a to | echnique to measure |
| | | to measure : |
| | (1) Electrical conductivity | (2) Impact energy |
| | (3) Thermal expansion | (4) Specific heat |
| | 157 or 0 mort (15) | |
| 9. | Kind of electron microscope which is us | ed to study internal structure of cells is: |
| | (1) scanning electron microscope | structure of cells is: |
| | very seaming electron interoscope | |
| | (2) transmission electron microscope | |
| | (3) light microscope | |
| | (4) compound microscope | |
| 10. | Floatrons | |
| 10. Electrons of Scanning Electron Microscope are reflected through: | | |
| | (1) glass linnel | |
| | | (2) specimen |
| | (3) metal-coated surfaces | (4) vacuum |
| PHD/I | RS-EE-2022/(Food Tech.)(SET-Y)/(A) | (4) vacuum chamber |
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| 11. | ISO 9001:2008 is an update of an earlier | ISO: | |
|-----|--|--|----------|
| | (1) ISO 9000:2005 | (2) ISO 9001:2000 | |
| | (3) ISO 9000:2000 | (4) ISO 9004:2000 | |
| | Til. 1.4 Liter was a servent suin cinles | are defined in | |
| 12. | The eight quality management principles | s are defined in . | |
| | (1) ISO 9000:2000 | (2) ISO 9004:2000 | |
| | (3) ISO 9000:2005 | (4) Both (1) & (2) | |
| | The primary function of a QA departmen | at is to provide confidence for ? | |
| 13. | The primary function of a QA departmen | it is to provide confidence | |
| | (1) Supplier | (2) Retailer | |
| | (3) Management and Consumer | (4) Wholesaler | |
| | | the large and controlling t | he · |
| 14. | Good manufacturing practice means und | erstanding, analyzing and controlling is | |
| | (1) The manufacturing process | (2) Laboratory | |
| | (3) Distribution of food | (4) None of the above | |
| | What is the purpose of FSMS (Food Safe | ety Management System) ? | |
| 15. | what is the purpose of 1 51125 (2 | 1 1 -f -sfo food | |
| | (1) To ensure the storage, distribution an | nd sale of sale food. | |
| | (2) To ensure the manufacture, distribut | ion and sale of safe food. | |
| | (3) To ensure the manufacture, storage a | and sale of safe food. | |
| | (4) To ensure the manufacture, storage, | distribution and sale of safe food. | |
| | (4) To ensure the manufacture, | | |
| 16. | Molecular sieves are regenerated by heat | ting to: | |
| | (1) <150°C | (2) >500°C | |
| | | (4) >1000°C | |
| | (3) 200-330°C | | P. T. O. |
| | | | 1. 1. 0. |

| 17 | 7. According to Poiseuille's law, the permeability for gas flow through a capillary | | |
|-------|---|--|--|
| | proportional to (μ =gas viscosity): | | |
| | (1) μ | (2) 1/µ | |
| | (3) √μ | (4) μ^2 | |
| 18. | Particle density of an agricultural production | duce is 1.95 g/cc. The porosity of the bulk | |
| | 36%. The bulk density of the produce is | | |
| | (1) 1.10 | (2) 1.25 | |
| | (3) 1.75 | (4) 1.85 | |
| 19. | The ratio between apertures in consecuti | ve screen in Tyler series is: | |
| | (1) 2 | (2) 2 ^{1/2} | |
| | (3) 2 ^{1/4} | (4) Both (2) and (3) | |
| 20. | Angle of nip is formed by the : | | |
| | (1) particle to be ground with the roll | | |
| | (2) tangents to the roll faces at the point of contact between a particle and rolls | | |
| | (3) heap of material in free fall to the ro | lls | |
| | (4) None of these | | |
| | | THE REAL PROPERTY AND ADDRESS OF THE PARTY O | |
| 21. | | uce is 1.95 g/cc. The porosity of the bulk is | |
| | 36 %. The bulk density of the produce is | | |
| | (1) 1.10 | (2) 1.25 | |
| | (3) 1.75 | (4) 1.85 | |
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| | | | |

| 22. | Which one is a faster method for separating solid particles from a mixture of solids? | | |
|------|---|--|--|
| | (1) Aspiration | (2) Cyclone separation | |
| | (3) Centrifugal separation | (4) Fluidization | |
| 23. | The higher values of angle of internal fri | ction indicate that the material is: | |
| | (1) Cohesive | (2) Easy flowing | |
| | (3) Free flowing | (4) None of these | |
| 24. | The differential speed of rolls used in wh | neat mill is: | |
| | (1) 1.5:1 | (2) 2.5:1 | |
| | (3) 4.5:1 | (4) 3.5:1 | |
| 25. | Which of the following law is used material? | to predict energy requirement for grinding a | |
| | (1) Raoult's law | (2) Newton's law | |
| | (3) Kick's law | (4) Stoke's law | |
| 26. | Moisture content of wheat on dry basis i | s 25%, what will be on wet basis? | |
| | (1) 20% | (2) 28% | |
| | (3) 24% | (4) 26% | |
| 27. | Watson law, which gives a relationship | between the concentration of bactericide 'C' | |
| | and the time necessary to accomplish a s | tandard destruction, is given by: | |
| | (1) Ct = constant | (2) C/t = constant | |
| | (3) $C^2t = constant$ | (4) $C^n t = constant$ | |
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| | ac 1 mater | ial are used to indicate: | | |
|------|---|--|--|--|
| 28. | 28. Transmittance properties of food material are used to indicate: | | | |
| | (1) Extent of processing in biscuits | | | |
| | (2) Core defects in fruits | | | |
| | (3) Bruised fruits | | | |
| | (4) All of these | | | |
| 29. | During the discharge of the solids of bir | ns and hoppers, the angle comes into play is: | | |
| | (1) angle of friction | (2) dynamic angle of friction | | |
| | (3) angle of repose | (4) angle of rotation | | |
| | | and a smoon . | | |
| 30. | Dielectric constant of a food material de | epends upon . | | |
| | (1) Temperature | (2) Moisture content | | |
| | (3) Density | (4) Electrical conductivity | | |
| 31. | Plank's equation describing freezing of the following was <i>not</i> one of these assur | food was derived from a few assumptions and apptions: | | |
| | (1) Pseudo-steady state condition | | | |
| | (2) A definite freezing point | | | |
| | (3) Freezing starts at the freezing point | | | |
| | (4) None of the above | | | |
| | | -ingis: | | |
| 32. | Temperature commonly used for air free | | | |
| | (1) -23°C to -30°C | (2) -180C to -40°C | | |
| | (3) -40°C to -42°C | (4) 23°C to 30°C | | |
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| 33. | Coefficient of | performance of | f a | refri | gerator | is | given | by | |
|-----|----------------|----------------|-----|-------|---------|----|-------|----|--|
|-----|----------------|----------------|-----|-------|---------|----|-------|----|--|

- (1) Heat removed by the evaporator divided by the heat rejected by the condenser
- (2) Heat removed by the evaporator divided by the compressor work
- (3) Heat rejected by the condenser divided by compressor work
- (4) None of the above

34. Pick out the correct relationship between Ri (internal reflux ratio) and Ro (external reflux ratio):

(1) (1+Ro)=Ro/Ri

(2) (1-Ro)=Ro/Ri

(3) (1+Ro)=Ro/Ri

(4) (1-Ri)=Ro/Ri

35. In case of gases, the binary diffusivity is proportional to (where p=pressure):

(1) p

(2) 1/p

 $(3) 1/\sqrt{p}$

(4) √p

36. In extraction, as the temperature increases, the area of heterogeneity (area covered by binodal curve):

(1) Decreases

(2) Increases

(3) Remain unchanged

(4) None of these

37. Azeotropic distillation is employed to separate:

- (1) Constant boiling mixture
- (2) High boiling mixture
- (3) Mixture with very high relative volatility
- (4) Heat sensitive materials

| 38. | The non-dimensional number of mass transfer which is function of Prandtl number and | | |
|-----|---|---|--|
| | Schmidt number is: | | |
| | (1) Sherwood number | (2) Lewis number | |
| | (3) Nusselt number | (4) Grates number | |
| 39. | In which model, monolayer value comes | s into function: | |
| | (1) BET model | (2) Kelvin model | |
| | (3) GAB model | (4) Henderson model | |
| 40. | Constant rate of drying is directly propo | rtional to: | |
| | (1) Convective heat transfer coefficient | | |
| | (2) Latent heat of vaporization | | |
| | (3) Wet bulb temperature | | |
| | (4) None of the above | | |
| 41. | Infrared wavelength is represented by w | hich of the following? | |
| | $(1) 10^{-4} \text{ cm}$ | $(2) 10^{-5} \text{ cm}$ | |
| | (3) 10 ⁻⁶ cm | (4) 10^{-2} cm | |
| 42. | Which of the following methods can't be | e used to calculate thermal process time? | |
| | (1) General method | (2) Runga- Kutta method | |
| | (3) Formula method | (4) Hayakawa method | |

43. If the value of Z is around 115° C, then Q_{10} will be:

(1) 1.22

(2) 2.11

(3) 1.586

(4) 5.18

44. Thermal death time model equations for microbial inactivation at different temperatures can be expressed as:

(1) $\log \frac{F}{F_0} = \frac{T - T_0}{Z}$

(2) $\log \frac{D}{D_0} = \frac{T - T_0}{Z}$

(3) $\log \frac{t_0}{t_T} = -\frac{T - T_0}{Z}$

(4) All of these

45. Kg of steam/kg of water vapour removed in an evaporator is called:

(1) Efficiency

(2) Effectiveness

(3) Steam use ratio

(4) Specific steam consumption

46. Radiation heat transfer is characterized by:

- (1) Energy transport as a result of bulk fluid motion
- (2) Thermal energy transfer as vibrational energy in the lattice structure of the material
- (3) Movement of discrete packets of energy as electromagnetic wanes
- (4) Circulation of fluid motion depends on buoyancy effects

47. The time temperature combination for HTST pasteurization of 71.1°C for 15 sec is selected on the basis of :

(1) Coxiella burnetii

(2) E. coli

(3) B. subtilis

(4) C. botulinum

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- 48. Stationary phase is described as:
 - (1) no further increase in the cell population after a maximum value
 - (2) deceleration of growth and division rate after the growth rate reaches a maximum
 - (3) acceleration of growth and division rate after the growth rate reaches a maximum
 - (4) deceleration of growth and division rate after the growth rate reaches a minimum
- 49. The function of the disengagement zone in an airlift fermenter is to:
 - (1) prevent CO₂ rich bubbles from entering the downcomer
 - (2) reduce the velocity of the bubbles
 - (3) reduce liquid loss as aerosols
 - (4) all of the above
- **50.** The monod model predicts that the specific growth rate:
 - (1) will decrease with the conc. of the growth limiting substrate
 - (2) will increase with the conc. of the growth limiting substrate until it reaches a maximum value
 - (3) will increase with the conc. of the growth limiting substrate
 - (4) does not depend on growth limiting substrate
- 51. Which one of the following cannot be the unit of convective heat transfer coefficient?
 - (1) $W/m^2.K$

(2) kW/m².K

(3) Btu/ft³.h.°C

(4) kcal/m².h.°C

52. The emissive power of a body depends on:

(1) Nature of body

- (2) Physical nature
- (3) Temperature of body
- (4) All of the above

53. Licensing and registering authority have the power to

(1) Registration

- (2) Licensing
- (3) Cancellation of License
- (4) All of the above

54. The Global Food Safety Initiative was created by the:

- (1) Food and Drug Administration
- (2) British Retail Consortium (BRC)
- (3) Global Food Business Forum
- (4) World Health Organization (WHO)

55. In a concentric double pipe heat exchanger one fluid undergoes phase change:

- (1) Two fluids should opposite to each other
- (2) Two fluids should flow parallel to each other
- (3) Two fluids should flow normal to each other
- (4) The direction of flow of the two fluids are of no consequences

56. For a perfectly black body:

- (1) $\alpha = 1$, $\epsilon = 0$, $\tau = 0$
- (2) $\alpha = \varepsilon = 0$, P = 1

(3) $\alpha = \tau = 0$, $\varepsilon = 1$

(4) None of these

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| 57. | For laminar flow (in flow inside pipes) S | herwood number shows the same trends as: |
|------|---|--|
| | (1) Nusselt number | (2) Reynolds number |
| | (3) Stanton number | (4) Prandtl number |
| 58. | Effect of temperature on the reaction rat | e is given by: |
| | (1) Arrhenius equation | (2) Gibbs Helmholtz equation |
| | (3) Kirchoff's law | (4) None of the above |
| 59. | Which of the following is true about ISO | 2002 method for Salmonella detection? |
| | (1) Selenite cystine (SC) broth is novobiocin broth (MKTTn) | replaced by Muller Kauffmann tetrathionate |
| | (2) Rappaport Vassiliadis (RV) broth h (RVS broth | as been replaced by Rappaport Vassiliadis Soya |
| | (3) XLD is the first isolation medium r | ather than BGA |
| | (4) All of these | |
| 60. | What are the intrinsic factors for the mi | crobial growth? |
| | (1) pH | (2) Moisture |
| | (3) Oxidation-Reduction Potential | (4) All of these |
| 61. | Among the following which group of f | at is unsaturated? |
| | (1) Oleic, Linoleic | (2) Butyric, Lauric |
| | (3) Caproic, Butyric | (4) Styrene, Lauric |
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| 62. | When vapor pressure of water at surface is more than vapor pressure of atmosphere: | | |
|-------|--|---|--|
| | (1) Water starts boiling | (2) Water escapes | |
| | (3) No effect | (4) None of the above | |
| 63. | Which is major phenol substrate for phenol | nolase action in enzymatic browning reaction? | |
| | (1) Caffeic acid | (2) Chlorogenic acid | |
| | (3) Phenol oxidase | (4) Tyrosine | |
| 64. | Phenomenon of osmosis causes membrane. | of true liquid separated by chemical | |
| | (1) Change in relative density | | |
| | (2) Change in specific gravity | | |
| | (3) Change in relative volume | | |
| | (4) Change in relative viscosity | | |
| 65. | A liquid freeze when its vapor pressure i | s equal to : | |
| | (1) Vapor pressure of solid | | |
| | (2) Vapor pressure of atmosphere | | |
| | (3) Vapor pressure of liquid | | |
| | (4) None of the above | | |
| 66. | The final browning pigment of enzymatic | e browning reaction is: | |
| | (1) Melanin | (2) O-diphenol | |
| | (3) Orthoquinone | (4) Caffeic acid | |
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| 67. | . Water activity of the solution having lo | w solute concentration can be obtained from |
|-------|--|---|
| | $(1) \ a_w = X_w$ | (2) $a_w = LN X_w$ |
| | (3) $LN_{aw} = X_w$ | $(4) a_w = 1/X_w$ |
| 68. | Water can be best described as: | |
| | (1) Pseudoplastic, Thixotropic | (2) Dilatent, Rheopectic |
| | (3) Dilatent, Pseudoplastic | (4) Newtonian |
| 69. | Freeze burn is a defect which generally | occurs in frozen foods due to: |
| | (1) Dehydration | (2) Osmosis |
| | (3) Thermal conductivity | (4) Rehydration |
| 70. | Most commonly used material for micr | owave oven packaging is made up of: |
| | (1) Wood | (2) Paper |
| | (3) Plastic | (4) Aluminum foil |
| 71. | A keto acid involved in carbohydrate n | netabolism is: |
| | (1) Citric acid | (2) Pyruvic acid |
| | (3) Succinic acid | (4) Tricarboxylic acid |
| 72. | Carbohydrate free human diet leads to | |
| | (1) Addition's disease | (2) Hyper adrenalism |
| | (3) Hypothyroidism | (4) Ketosis |
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| 73. | The most common simple proteins which | h act as reserve proteins in plants are: | |
|-----|---|---|--|
| | (1) Albumins | (2) Globulins | |
| | (3) Glutelins | (4) Prolamins | |
| 74. | The parts of the body protein that can be test is known as: | e replaced by 100 parts of the protein fed in the | |
| | (1) Biological value | | |
| | (2) Chemical score | | |
| | (3) Digestibility coefficient | | |
| | (4) Protein Efficiency Ratio | | |
| 75. | Riboflavin is rapidly destroyed in: | | |
| | (1) Acid medium | | |
| | (2) Alkaline medium | | |
| | (3) Neutral medium | | |
| | (4) All the above | | |
| 76. | Consumption of raw eggs by adults may | lead to: | |
| | (1) Biotin deficiency | | |
| | (2) Calcium deficiency | | |
| | (3) Folic acid deficiency | | |
| | (4) Phosphorus deficiency | | |

| 77. | Monosaccharides constituting lactose are | 2: |
|-----|---|-------------------------------|
| | (1) Galactose-galactose | |
| | (2) Galactose-glucose | |
| | (3) Glucose-glucose | |
| | (4) Glucose-fructose | |
| 78. | Differential speed ratio of the pairs of br | reak rolls of Buhler mill is: |
| | (1) 3:1 | (2) 2.5:1 |
| | (3) 1.5:1 | (4) 1:1 |
| 79. | One refrigeration ton is equivalent to: | |
| | (1) 1000 kg/day | |
| | (2) 1000 Btu/day | |
| | (3) 12000 kg/hour | |
| | (4) 12000 Btu/hour | |
| 80. | Cleaning of cereals by aspiration is base | ed on: |
| | (1) Aerodynamic properties | |
| | (2) Hydrodynamic properties | |

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(3) Magnetic properties

(4) Thermal properties

| 81. | Alcohol ppt. test determines : | |
|-------|--|---|
| | (1) Adulteration of milk | |
| | (2) Percentage of fat in milk | |
| | (3) Milk acidity | |
| | (4) Heat stability of milk | |
| 82. | Food that exhibits Newtonian flow beha | viour best among the following is: |
| | (1) Dairy cream | (2) Fruit purees |
| | (3) Milk | (4) Protein concentrate |
| 83. | Permeability of plastic packaging films to | to gases is given by: |
| | (1) Bear's law | (2) Fick's law |
| | (3) Fink's law | (4) Flemming's law |
| 84. | Rate of sedimentation of particles during | fruit juice clarification is governed by: |
| | (1) Fick's law | (2) Kick's law |
| | (3) Ostwald's law | (4) Stoke's law |
| | | |
| 85, | Working fluid employed in heat pump cy | vcle is: |
| | (1) Ammonia gas | (2) Freon gas |
| | (3) Steam | (4) Hot water |
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| 86. | The relationship between moisture content and water activity of foods is given by: | | |
|-----|--|---|--|
| | (1) BET equation | (2) Fourier's equation | |
| | (3) Stefan's Law | (4) Plank's equation | |
| 87. | The pigments responsible for the red and | d purple colour of fruits and vegetables are: | |
| | (1) Myoglobin | (2) Oxymyoglobin | |
| | (3) Anthocyanins | (4) Pheophytins | |
| 88. | The sole pigments in vegetables such as | s potato and yellow skinned onion are: | |
| | (1) Myoglobin | (2) Anthocyanins | |
| | (3) Pheophytins | (4) Flavonoids | |
| 89. | The delayed bitterness in oranges and g | grapefruits is due to : | |
| | (1) Terpene limonin | (2) Hesperidin | |
| | (3) Allicin | (4) Naringin | |
| 90. | The most common flavonoid in the pee | els of oranges and lemons is : | |
| | (1) Terpene limonin | (2) Hesperidin | |
| | (3) Allicin | (4) Naringin | |
| 91. | The characteristic odour of garlic is du | e to: | |
| | (1) Naringin | (2) Allicin | |
| | (3) Hesperidin | (4) Thioglucosides | |
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| 92. | The flavour components of the cabbage and cauliflower are due to: | | |
|------|---|--|--|
| | (1) Naringin | (2) Allicin | |
| | (3) Hesperidin | (4) Thioglucosides | |
| 93. | The formation of brown colour in fruit following enzyme on phenolic substance | s and vegetables when cut is due to the action of ces. | |
| | (1) Tyrosinase | (2) Amylase | |
| | (3) Phenolase | (4) Peroxidase | |
| 94. | The enzyme which hydrolyzes sucrose | into glucose and fructose is: | |
| | (1) α-amylase | (2) β-amylase | |
| | (3) Cellulase | (4) Invertase | |
| 95. | The haziness noticed in fruit juices and | wines can be removed using: | |
| | (1) Cellulase | (2) Pectinase | |
| | (3) Invertase | (4) α-amylase | |
| 96. | The enzyme which decomposes hydrog | en peroxide to water is: | |
| | (1) Cellulase | (2) Lipase | |
| | (3) Catalase | (4) α-amylase | |
| 97. | The enzyme which bleaches the flour to | produce a very white crumb is: | |
| | (1) Invertase | (2) Lipoxygenases | |
| Tre- | (3) Catalase | (4) Pectinase | |
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| 98. | A mole of non-ionizin | z solute in a litt | e of water | depresses its | freezing | point by | į |
|-----|-----------------------|--------------------|------------|---------------|----------|----------|---|
|-----|-----------------------|--------------------|------------|---------------|----------|----------|---|

(1) 5.58°C

(2) 3.72°C

(3) 2.24°C

(4) 1.80°C

99. The gas used for flushing the processed and packaged food is:

(1) Hydrogen

(2) Nitrogen

(3) Carbon dioxide

(4) Oxygen

100. Heat conduction in glass is due to:

- (1) Electromagnetic waves
- (2) Elastic impact of molecules
- (3) Motion of electrons
- (4) Mixing motion of different layers of gas

Total No. of Printed Pages: 21

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

В

Ph.D./URS-EE-Jan-2022

SUBJECT: Food Technology

SET-Y

10002

| | | Sr. No |
|------------------------------|----------------------|--------------------------------|
| Time: 11/4 Hours | Max. Marks : 100 | Total Questions: 100 |
| Roll No. (in figures) | (in words) | |
| Name | Father's Name | |
| Mother's Name | Date of Examination_ | |
| | | |
| (Signature of the Candidate) | | (Signature of the Invigilator) |

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- 2. The candidates *must return* the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
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- 4. Question Booklet along with answer key of all the A, B, C & D code will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examination in writing/through E.Mail within 24 hours of uploading the same on the University Website. Thereafter, no complaint in any case, will be considered.
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- 6. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
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- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

PHD/URS-EE-2022/(Food Tech.)(SET-Y)/(B)

T V III

- 1. Infrared wavelength is represented by which of the following?
 - (1) 10⁻⁴ cm
- (2) 10^{-5} cm
- (3) 10⁻⁶ cm
- (4) 10^{-2} cm
- Which of the following methods can't be used to calculate thermal process time?
 - (1) General method

(2) Runga- Kutta method

(3) Formula method

- (4) Hayakawa method
- If the value of Z is around 115°C, then Q₁₀ will be:
 - (1) 1.22
- (2) 2.11
- (3) 1.586

- (4) 5.18
- Thermal death time model equations for microbial inactivation at different temperatures can be expressed as:

 - (1) $\log \frac{F}{F_0} = \frac{T T_0}{Z}$ (2) $\log \frac{D}{D_0} = \frac{T T_0}{Z}$
 - (3) $\log \frac{t_0}{t_T} = -\frac{T T_0}{Z}$ (4) All of these et and the efficiency as the state of the section of
- 5. Kg of steam/kg of water vapour removed in an evaporator is called:
 - (1) Efficiency
 - (2) Effectiveness
 - (3) Steam use ratio
 - (4) Specific steam consumption

| 6. | Radiation heat transfer is characterized by: |
|----|--|
| | (1) Energy transport as a result of bulk fluid motion |
| | (2) Thermal energy transfer as vibrational energy in the lattice structure of the material |
| | (3) Movement of discrete packets of energy as electromagnetic wanes |
| | (4) Circulation of fluid motion depends on buoyancy effects |
| 7. | The time temperature combination for HTST pasteurization of 71.1°C for 15 sec i selected on the basis of : |
| | (1) Coxiella burnetii (2) E. coli |
| | (3) B. subtilis (4) C. botulinum |
| 8. | Stationary phase is described as: |
| | (1) no further increase in the cell population after a maximum value |
| • | (2) deceleration of growth and division rate after the growth rate reaches a maximum |
| | (3) acceleration of growth and division rate after the growth rate reaches a maximum |
| | (4) deceleration of growth and division rate after the growth rate reaches a minimum |
| 9. | The function of the disengagement zone in an airlift fermenter is to: |
| | (1) prevent CO ₂ rich bubbles from entering the downcomer |
| | (2) reduce the velocity of the bubbles |
| | (3) reduce liquid loss as aerosols |

(4) all of the above

| 10. | The monod model predicts that the specific growth rate: | | | |
|---------|--|---|--|--|
| | (1) will decrease with the conc. of the gr | owth limiting substrate | | |
| | (2) will increase with the conc. of the growth limiting substrate until it reaches a maximum value | | | |
| | (3) will increase with the conc. of the growth limiting substrate | | | |
| | (4) does not depend on growth limiting substrate | | | |
| 11. | Particle density of an agricultural prod | uce is 1.95 g/cc. The porosity of the bulk is | | |
| | 36 %. The bulk density of the produce is | | | |
| | (1) 1.10 | (2) 1.25 | | |
| | (3) 1.75 | (4) 1.85 | | |
| 12. | Which one is a faster method for separate | ing solid particles from a mixture of solids? | | |
| | (1) Aspiration | (2) Cyclone separation | | |
| | (3) Centrifugal separation | (4) Fluidization | | |
| 13. | The higher values of angle of internal fr | iction indicate that the material is: | | |
| | (1) Cohesive | (2) Easy flowing | | |
| | (3) Free flowing | (4) None of these | | |
| 14. | The differential speed of rolls used in v | wheat mill is: | | |
| | (1) 1.5:1 | (2) 2.5:1 | | |
| | (3) 4.5:1 | (4) 3.5:1 | | |
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| L Elder | | | | |

| 15. | material ? | law is used to pr | | | |
|-----|-----------------------------|------------------------|-----------------------------|--------------------------|----------|
| | (1) Raoult's law | | Newton's law | F 1.02 | |
| | (3) Kick's law | (4) | Stoke's law | and the second | |
| 16. | Moisture content of whea | at on dry basis is 259 | , what will be o | n wet basis? | |
| | (1) 20% | | | uri i di Maria 1911 - El | |
| | (3) 24% | (4) | | | |
| | Factor of the state of | , , | | | 1 17 |
| 17. | | | | | |
| | and the time necessary to | | | | |
| | (1) Ct = constant | (2) | C/t = constant | | |
| | (3) $C^2t = constant$ | (4) | C ⁿ t = constant | p = 1 | 2. 10 |
| 18. | Transmittance properties | of food material are | used to indicate | | 为。 是针 |
| | (1) Extent of processing | | | | |
| | (2) Core defects in fruits | | n ja | magama . 1 | |
| | (3) Bruised fruits | | | | |
| | (4) All of these | (I) 7 (1) (9) | in the April of | That may to | SP |
| | | 4 64 11 | | 17. 14. | |
| 19. | During the discharge of the | ne solids of bins and | hoppers, the ang | gle comes into pl | lay is : |
| | (1) angle of friction | -10 A - 1 | | Tul Walt & 1,1 | |
| | (2) dynamic angle of fric | tion that the large | e Marke | in salit | 7 4 |
| | (3) angle of repose | | | | |
| | (4) angle of rotation | | | | |
| | , | | | | THE SE |

| 20. | Dielectric constant of a food material depends upon: | | |
|-----|--|---|--|
| | (1) Temperature | (2) Moisture content | |
| | (3) Density | (4) Electrical conductivity | |
| | The application of filter(a) in the in- | | |
| 21. | The application of filter(s) in the image | analysis is: | |
| | (1) to remove unwanted noise | | |
| | (2) to sharpen the edges of objects | | |
| | (3) Both above | | |
| | (4) None of the above | | |
| | | | |
| 22. | With most modern equipment, | . gray levels are available. | |
| | (1) 255 | (2) 256 | |
| | (3) 251 | (4) 225 | |
| | Y a mained image having dimensions | of 512 pivole V 512 pivole each pivel has an | |
| 23. | integer value ranging: | of 512 pixels X 512 pixels, each pixel has an | |
| | - | (0) 7 | |
| | (1) From 100 to 1000 | (2) From 0 to 100 | |
| | (3) From 0 to 255 | (4) From 0 to 521 | |
| | Y 11 tasks the original army level in | rage is abanged from a continuum of t | |
| 24. | In binarization, the original gray level in | nage is changed from a continuum of . | |
| | (1) Colours or gray levels into a black a | nd white image | |
| | (2) Black and white levels into a colour | image | |
| | (3) Black level into a colour image | | |
| | (4) White level into a colour image | | |
| | | | |

| 28, | The mechanism of clastic can be descri- | bed by : | |
|-----|---|------------------------------|--------------------|
| | (1) Einstein theory | (2) Rubber elasticity the | ory |
| | (3) Plastic resilience system | (4) None of the above | |
| 26. | The ability of two materials to resist se | paration after their surface | s come into contac |
| | known as: | | |
| | (1) Cohesion | (2) Tack | |
| | (3) Adhesion | (4) Stickiness | |
| 27. | Low values for the surface energy of th | e solid means : | |
| | (1) Low adhesion | (2) High adhesion | |
| | (3) Low cohesion | (4) High cohesion | |
| 28. | Differential Scanning Calorimetry is a | technique to measure : | |
| | (1) Electrical conductivity | (2) Impact energy | |
| | (3) Thermal expansion | (4) Specific heat | |
| 29. | Kind of electron microscope which is u | sed to study internal struc | eture of cells is: |
| | (1) scanning electron microscope | | |
| | (2) transmission electron microscope | | |
| | (3) light microscope | | |
| | (4) compound microscope | | |

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| 30. | Electrons of Scanning Electron Microscope are reflected through: | | | |
|------|--|--------------------|----------|---------|
| | (1) glass funnel | (2) specimen | | |
| | (3) metal-coated surfaces | (4) vacuum chamber | | |
| 31. | The characteristic odour of garlic is due | to: | | |
| | (1) Naringin | (2) Allicin | | |
| | (3) Hesperidin | (4) Thioglucosides | | |
| 32. | 2. The flavour components of the cabbage and cauliflower are due to: | | | |
| | (1) Naringin | (2) Allicin | | |
| | (3) Hesperidin | (4) Thioglucosides | | |
| 33. | The formation of brown colour in fruits and vegetables when cut is due to the action of following enzyme on phenolic substances. | | | ion of |
| | (1) Tyrosinase | (2) Amylase | | |
| | (3) Phenolase | (4) Peroxidase | | . 2- |
| 34. | 1. The enzyme which hydrolyzes sucrose into glucose and fructose is: | | | |
| | (1) α-amylase | (2) β-amylase | | |
| | (3) Cellulase | (4) Invertase | | |
| 35. | 35. The haziness noticed in fruit juices and wines can be removed using: | | | * |
| | (1) Cellulase | (2) Pectinase | | |
| | (3) Invertase | (4) α-amylase | | |
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| 36. | The enzyme which decomposes hydrogen peroxide to water is: | | |
|-----|--|--|--|
| | (1) Cellulase | (2) Lipase | |
| | (3) Catalase | (4) α-amylase | |
| 37. | The enzyme which bleaches the flour to | produce a very white crumb is: | |
| | (1) Invertase | (2) Lipoxygenases | |
| | (3) Catalase | (4) Pectinase | |
| 38. | A mole of non-ionizing solute in a litre | of water depresses its freezing point by | |
| | (1) 5.58°C | (2) 3.72°C | |
| | (3) 2.24°C | (4) 1.80°C | |
| 39. | The gas used for flushing the processed | d and packaged food is: | |
| | (1) Hydrogen | (2) Nitrogen | |
| | (3) Carbon dioxide | (4) Oxygen | |
| | | | |
| 40. | Heat conduction in glass is due to: | | |
| | (1) Electromagnetic waves | | |
| | (2) Elastic impact of molecules | | |
| | (3) Motion of electrons | | |
| | (4) Mixing motion of different layers | of gas | |
| | | | |
| 41. | Among the following which group of | fat is unsaturated? | |
| | (1) Oleic, Linoleic | (2) Butyric, Lauric | |
| | (3) Caproic, Butyric | (4) Styrene, Lauric | |

| 42. | When vapor pressure of water at surface is more than vapor pressure of atmosphere: | | |
|-----|--|--|--|
| | (1) Water starts boiling | (2) Water escapes | |
| | (3) No effect | (4) None of the above | |
| 43. | Which is major phenol substrate for ph | enolase action in enzymatic browning reaction? | |
| | (1) Caffeic acid | (2) Chlorogenic acid | |
| | (3) Phenol oxidase | (4) Tyrosine | |
| 44. | Phenomenon of osmosis causes of true liquid separated by chemical membrane. | | |
| | (1) Change in relative density | | |
| | (2) Change in specific gravity | | |
| | (3) Change in relative volume | | |
| | (4) Change in relative viscosity | | |
| 45. | A liquid freeze when its vapor pressure | e is equal to: | |
| | (1) Vapor pressure of solid | | |
| | (2) Vapor pressure of atmosphere | in the second of | |
| | (3) Vapor pressure of liquid | | |
| | (4) None of the above | | |
| 46. | The final browning pigment of enzym | atic browning reaction is: | |
| | (1) Melanin | (2) O-diphenol | |
| | (3) Orthoquinone | (4) Caffeic acid | |
| | | PTC | |

| 47 | Weter activity of the solution having low | v solute concentration can be obtained from: | |
|------|--|--|--|
| 47. | (1) $a_w = X_w$ | (2) $a_w = LN X_w$ | |
| | $(3) LN_{aw} = X_{w}$ | (4) $a_w = 1/X_w$ | |
| 48. | Water can be best described as: | | |
| | (1) Pseudoplastic, Thixotropic | | |
| | (2) Dilatent, Rheopectic | | |
| | (3) Dilatent, Pseudoplastic | | |
| | (4) Newtonian | | |
| 49. | Freeze burn is a defect which generally | occurs in frozen foods due to: | |
| | (1) Dehydration | (2) Osmosis | |
| | (3) Thermal conductivity | (4) Rehydration | |
| 50. | . Most commonly used material for microwave oven packaging is made up of : | | |
| | (1) Wood | (2) Paper | |
| | (3) Plastic | (4) Aluminum foil | |
| 51. | 1 | | |
| | the following was <i>not</i> one of these assur | mptions: | |
| | (1) Pseudo-steady state condition | | |
| | (2) A definite freezing point | | |
| | (3) Freezing starts at the freezing point | | |
| | (4) None of the above | | |
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52. Temperature commonly used for air freezing is:

| | (1) −23°C to −30°C | (2) $-180C$ to $-40^{\circ}C$ | |
|------|---|---|--|
| | (3) -40°C to -42°C | (4) 23°C to 30°C | |
| 53 | Coefficient of performance of a refri | gerator is given by: | |
| | (1) Heat removed by the evaporator | divided by the heat rejected by the condenser | |
| | (2) Heat removed by the evaporator | divided by the compressor work | |
| | (3) Heat rejected by the condenser divided by compressor work | | |
| | (4) None of the above | | |
| | | • | |
| 54. | . Pick out the correct relationship between Ri (internal reflux ratio) and Ro (external | | |
| | reflux ratio): | | |
| | (1) (1+Ro)=Ro/Ri | (2) (1–Ro)=Ro/Ri | |
| | (3) (1+Ro)=Ro/Ri | (4) (1–Ri)=Ro/Ri | |
| 55. | 5. In case of gases, the binary diffusivity is proportional to (where p=pressure): | | |
| | (1) p | (2) 1/p | |
| | (3) 1∕√p | (4) √p | |
| 56. | In extraction, as the temperature incre | eases, the area of heterogeneity (area covered by | |
| | binodal curve): | | |
| | (1) Decreases | (2) Increases | |
| | (3) Remain unchanged | (4) None of these | |
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| 57. | Azeotropic distillation is emp | loyed to separate: | |
|------|--|---|--|
| | (1) Constant boiling mixture | | |
| | (2) High boiling mixture | | |
| | (3) Mixture with very high re | elative volatility | |
| | (4) Heat sensitive materials | | |
| 58. | The non-dimensional number | of mass transfer which is function of Prandtl number an | |
| | Schmidt number is: | | |
| | (1) Sherwood number | (2) Lewis number | |
| | (3) Nusselt number | (4) Grates number | |
| 59. | In which model, monolayer value comes into function: | | |
| | (1) BET model | (2) Kelvin model | |
| | (3) GAB model | (4) Henderson model | |
| 60. | Constant rate of drying is dir | ectly proportional to: | |
| | (1) Convective heat transfer | coefficient | |
| | (2) Latent heat of vaporizati | on | |
| | (3) Wet bulb temperature | | |
| | (4) None of the above | | |
| 61. | A keto acid involved in carbohydrate metabolism is: | | |
| | (1) Citric acid | (2) Pyruvic acid | |
| | (3) Succinic acid | (4) Tricarboxylic acid | |
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Carbohydrate free human diet leads to:

| | (1) Addition's disease | | |
|-------|---|-------------------------|---------------------------------|
| | (2) Hyper adrenalism | | |
| | (3) Hypothyroidism | | |
| | (4) Ketosis | | ta sugar a series |
| 63. | The most common simple proteins w | which act as reserve pr | oteins in plants are: |
| | (1) Albumins | (2) Globulins | |
| | (3) Glutelins | (4) Prolamins | |
| 64. | The parts of the body protein that cattest is known as: | an be replaced by 100 | parts of the protein fed in the |
| | (1) Biological value | | r parties of |
| | (2) Chemical score | | |
| | (3) Digestibility coefficient | | |
| | (4) Protein Efficiency Ratio | | |
| 65. | Riboflavin is rapidly destroyed in: | | |
| | (1) Acid medium | | |
| | (2) Alkaline medium | | |
| | (3) Neutral medium | | |
| | (4) All the above | | |
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| 66 | 66. Consumption of raw eggs by adults m | ay lead to: |
|-----|---|--------------------------------|
| | (1) Biotin deficiency | |
| | (2) Calcium deficiency | |
| | (3) Folic acid deficiency | |
| | (4) Phosphorus deficiency | |
| 67 | 67. Monosaccharides constituting lactose | are: |
| | (1) Galactose-galactose | |
| | (2) Galactose-glucose | |
| | (3) Glucose-glucose | |
| | (4) Glucose-fructose | |
| 68 | 8. Differential speed ratio of the pairs of | break rolls of Buhler mill is: |
| | (1) 3:1 | (2) 2.5:1 |
| | (3) 1.5:1 | (4) 1:1 |
| 69. | 9. One refrigeration ton is equivalent to | tani u tani |
| | (1) 1000 kg/day | |
| | (2) 1000 Btu/day | |
| | (3) 12000 kg/hour | |

(4) 12000 Btu/hour

| 70 | Cleaning of cereals by aspiration is bas | ed or | 130 | | |
|-----|---|-------|-----------------------|----------------------|--|
| | (1) Aerodynamic properties | | | | |
| | (2) Hydrodynamic properties | | | | |
| | (3) Magnetic properties | | | | |
| | (4) Thermal properties | | | | |
| 71. | Alcohol ppt. test determines: | | | | |
| | (1) Adulteration of milk | | | | |
| | (2) Percentage of fat in milk | | | personal territorial | |
| | (3) Milk acidity | | | 4 (** - = | |
| | (4) Heat stability of milk | | | | |
| 72. | Food that exhibits Newtonian flow beha | aviou | r best among the | following is : | |
| | (1) Dairy cream | (2) | Fruit purces | | |
| | (3) Milk | (4) | Protein concentr | ate | |
| 73. | Permeability of plastic packaging films | to ga | ses is given by: | | |
| | (1) Bear's law | (2) | Fick's law | (4) (1) | |
| | (3) Fink's law | (4) | Flemming's law | | |
| 74. | Rate of sedimentation of particles during | g fru | it juice clarificatio | on is governed by: | |
| | (1) Fick's law | (2) | Kick's law | endigeton tidak | |
| | (3) Ostwald's law | (4) | Stoke's law | | |

| 75. | Working fluid employed in heat pump cy | yala is: |
|------|--|--|
| | (1) Ammonia gas | (2) Freon gus |
| | (3) Steam | (4) Hot water |
| 76. | The relationship between moisture conto | ent and water activity of foods is given by: |
| | (1) BET equation | (2) Fourier's equation |
| | (3) Stefan's Law | (4) Plank's equation |
| 77. | The pigments responsible for the red and | d purple colour of fruits and vegetables are: |
| | (1) Myoglobin | (2) Oxymyoglobin |
| | (3) Anthocyanins | (4) Pheophytins |
| 78. | The sole pigments in vegetables such as | potato and yellow skinned onion are: |
| | (1) Myoglobin | (2) Anthocyanins |
| | (3) Pheophytins | (4) Flavonoids |
| 79. | The delayed bitterness in oranges and g | rapefruits is due to: |
| | (1) Terpene limonin | (2) Hesperidin |
| | (3) Allicin | (4) Naringin |
| 80. | The most common flavonoid in the peel | s of oranges and lemons is: |
| | (1) Terpene limonin | (2) Hesperidin |
| | (3) Allicin | (4) Naringin |
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| 3 | | | 17 |
|------|--|---------------------------------------|----|
| o1. | ISO 9001:2008 is an update of an earlier ISO | | |
| , D' | (1) ISO 9000:2005 | 1SO 9001:2000 | |
| | (4) | ISO 9004:2000 | |
| 82. | The eight quality management principles are | defined in | |
| | (1) ISO 9000:2000 | ISO 9004:2000 | |
| | (2) 180 9000.2003 | Both (1) & (2) | |
| 83. | The primary function of a QA department is | | |
| | (1) Supplier (2) | Retailer | |
| | (3) Management and Consumer (4) | Wholesaler | |
| 84. | Good manufacturing practice means underst | anding, analyzing and controlling the | 4 |
| | (1) The manufacturing process |) Laboratory | |
| | (3) Distribution of food (4 | None of the above | |
| 85. | What is the purpose of FSMS (Food Safety | Management System) ? | |
| | (1) To ensure the storage, distribution and | | |
| | (2) To ensure the manufacture, distribution | and sale of safe food. | |
| | (3) To ensure the manufacture, storage and | sale of safe food. | |
| | (4) To ensure the manufacture, storage, dis | stribution and sale of safe food. | |
| 86. | Molecular sieves are regenerated by heatin | g to : " | |
| | (1) <150°C | | |
| | (3) 200-330°C | 4) >1000°C | |

| | | | | | desaugh a conti | |
|-----|-------------------------------|--------------------------------------|--------------|-----------------|--|-----|
| 87. | According to P | oiseuille's law, the po | ermeability | for gas flo | w through a capillar | y i |
| | | μ =gas viscosity): | | | | |
| | (1) μ | | (2) 1/μ | | | |
| | (3) √μ | | | | Annuit in all | |
| 88. | Particle density | of an agricultural pro | oduce is 1. | 95 g/cc. The | e porosity of the bul | k i |
| | 36%. The bulk of | lensity of the produce i | s: | | | |
| | (1) 1.10 | e is terro a so in the d | (2) 1.25 | est the artific | en moral g | |
| | (3) 1.75 | | | | mercy (1) | |
| 89. | The ratio between | en apertures in consecu | tive screen | in Tyler seri | ies is: | |
| | (1) 2 (1) | n gnisyljan, pro k o | (2) 21/2 | | | |
| | $(3) 2^{1/4}$ | gradina di si natusi ni especiali | (4) Both | (2) and (3) | r (= im sil) (fi) | |
| 90. | Angle of nip is f | formed by the : | | | e go y na se native na | |
| | (1) particle to b | e ground with the roll | | | The same of the sa | |
| | (2) tangents to t | he roll faces at the poin | | | | |
| | (3) heap of mate | erial in free fall to the r | olls | winds here, r | 14. 14. 14. 14. 14. 14. 14. 14. 14. 14. | |
| | (4) None of the | se, uninderal | | tor. | ti aurin i i i i | |
| 91. | Which one of the | e following cannot be t | he unit of o | convective h | eat transfer coefficient | ? |
| | (1) W/m ² .K | 1920 | (2) kW/ | m².K | | |
| | (3) Btu/ft ³ .h.°C | OF DUALITY | (4) kcal | /m².h.°C | | |

| 92. | The emissive power of a body depends on: | |
|-----|--|--------------------------------------|
| | (1) Nature of body (2 | Physical nature |
| | (3) Temperature of body (4) |) All of the above |
| 93. | Licensing and registering authority have th | e power to |
| | (1) Registration (2 | 2) Licensing |
| | (3) Cancellation of License (4) | All of the above |
| 94. | 4. The Global Food Safety Initiative was creat | ated by the: |
| | (1) Food and Drug Administration | |
| | (2) British Retail Consortium (BRC) | |
| į , | (3) Global Food Business Forum | |
| | (4) World Health Organization (WHO) | |
| 9 | 95. In a concentric double pipe heat exchange | er one fluid undergoes phase change: |
| | (1) Two fluids should opposite to each o | |
| | (2) Two fluids should flow parallel to ea | ch other |

96. For a perfectly black body:

(1)
$$\alpha = 1, \epsilon = 0, \tau = 0$$

(2)
$$\alpha = \varepsilon = 0$$
, $P = 1$

(3)
$$\alpha = \tau = 0, \epsilon = 1$$

(4) None of these

(3) Two fluids should flow normal to each other

(4) The direction of flow of the two fluids are of no consequences

| | | shorwood number shows the same trends as: |
|------|---|--|
| 97. | For laminar flow (in flow inside pipes) | Sherwood number shows the same trends as: (2) Reynolds number |
| | (1) Nusselt number | (4) Prandtl number |
| | (3) Stanton number | (4) Prandu nom |
| 98. | Effect of temperature on the reaction rat (1) Arrhenius equation (3) Kirchoff's law | c is given by: (2) Gibbs Helmholtz equation (4) None of the above |
| 99. | Which of the following is true about ISO | 2002 method for Salmonella detection? |
| 33. | (1) Selenite cystine (SC) broth is novobiocin broth (MKTTn) | replaced by Muller Kauffmann tetrathionate |
| | (2) Rappaport Vassiliadis (RV) broth h | as been replaced by Rappaport Vassiliadis Soya |
| | (RVS broth (3) XLD is the first isolation medium ra | ather than BGA |
| | (4) All of these | random and the standard of |
| 100. | | crobial growth? |
| | (1) pH | the state of the s |
| | (2) Moisture | in the second of the disposition in the |
| | (3) Oxidation-Reduction Potential | egter delagropher de la |
| | (4) All of these | |
| | | |

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Ph.D./URS-EE-Jan-2022

SUBJECT: Food Technology

| S | - | T- | Y |
|---|---|----|---|
| | | | |

10007

| | | Sr. No |
|--|--------------------------------|--------------------------------|
| Time: 11/4 Hours Roll No. (in figures) | Max. Marks : 100 (in words) | Total Questions : 100 |
| Name | Father's Name | |
| Mother's Name | Date of Examination | |
| (Signature of the Candidate) | | (Signature of the Invigilator) |
| (Signature of the Candidate) | | |

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- 2. The candidates must return the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
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- 6. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
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PHD/URS-EE-2022/(Food Tech.)(SET-Y)/(C)

-

| 1. | ISO 9001:2008 is an update of an e | earlier ISO : |
|----|------------------------------------|---|
| | (1) ISO 9000:2005 | (2) ISO 9001:2000 |
| | (3) ISO 9000:2000 | (4) ISO 9004:2000 |
| 2. | The eight quality management prin | nciples are defined in : |
| | (1) ISO 9000:2000 | (2) ISO 9004:2000 |
| | (3) ISO 9000:2005 | (4) Both (1) & (2) |
| 3. | The primary function of a QA dep | artment is to provide confidence for ? |
| | (1) Supplier | (2) Retailer |
| | (3) Management and Consumer | (4) Wholesaler |
| 4. | Good manufacturing practice mea | ans understanding, analyzing and controlling the: |
| | (1) The manufacturing process | (2) Laboratory |
| | (3) Distribution of food | (4) None of the above |
| 5. | What is the purpose of FSMS (Fo | ood Safety Management System) ? |
| | (1) To ensure the storage, distrib | ution and sale of safe food. |
| | (2) To ensure the manufacture, d | istribution and sale of safe food. |
| 1 | (3) To ensure the manufacture, s | torage and sale of safe food. |
| | (4) To ensure the manufacture, s | torage, distribution and sale of safe food. |
| 6 | . Molecular sieves are regenerated | by heating to: |
| | (1) <150°C | (2) >500°C |
| | (3) 200-330°C | (4) >1000°C |

| 7. | According to Poiscuille's law, the I | permeability for gas flow through a capillary is |
|-----|---|--|
| | proportional to (μ ≋gas viscosity) : | |
| | (1) μ | (2) 1/μ |
| | (3) √μ | (4) μ^2 |
| 8. | Particle density of an agricultural pr | roduce is 1.95 g/cc. The porosity of the bulk is |
| | 36%. The bulk density of the produce | is: |
| | (1) 1.10 | (2) 1.25 |
| | (3) 1.75 | (4) 1.85 |
| 9. | The ratio between apertures in consecu | utive screen in Tyler series is: |
| | (1) 2 | $(2) 2^{1/2}$ |
| | (3) 2 ^{1/4} | (4) Both (2) and (3) |
| 10. | Angle of nip is formed by the: | |
| | (1) particle to be ground with the roll | |
| | (2) tangents to the roll faces at the poi | nt of contact between a particle and rolls |
| | (3) heap of material in free fall to the | rolls |
| | (4) None of these | |
| 1. | The characteristic odour of garlic is du | e to: |
| | (1) Naringin | (2) Allicin |
| | (3) Hesperidin | (4) Thioglucosides |

| 12 | The flavour componer | s of the cabbage and cauliflower are due to: |
|---|--|---|
| , | (1) Naringin | (2) Allicin |
| | (3) Hesperidin | (4) Thioglucosides |
| 13. | The formation of bro- following enzyme on | n colour in fruits and vegetables when cut is due to the action of shenolic substances. |
| | (1) Tyrosinase | (2) Amylase |
| | (3) Phenolase | (4) Peroxidase |
| 14. | The enzyme which h | drolyzes sucrose into glucose and fructose is: |
| | (1) α-amylase | (2) β-amylase |
| | (3) Cellulase | (4) Invertase |
| 15 | , The haziness notice | in fruit juices and wines can be removed using: |
| | (1) Cellulase | (2) Pectinase |
| | (3) Invertase | (4) α-amylase |
| 16 | 6. The enzyme which | lecomposes hydrogen peroxide to water is: |
| | (1) Cellulase | (2) Lipase |
| | (3) Catalase | (4) α-amylase |
| 17. The enzyme which bleaches the flour to produce a very white crumb is: | | |
| | (1) Invertase | (2) Lipoxygenases |
| | (3) Catalase | (4) Pectinase |
| PH | D/URS-EE-2022/(Fo | l Tech.)(SET-Y)/(C) |

| 18 | A mole of non-ionizing solute in a litre of water depresses its freezing point by: | | |
|-----|--|--------------------------------|--|
| | (1) 5.58°C | (2) 3.72°C | |
| | (3) 2.24°C | (4) 1.80°C | |
| 19. | The gas used for flushing the processed | and packaged food is: | |
| | (1) Hydrogen | (2) Nitrogen | |
| | (3) Carbon dioxide | (4) Oxygen | |
| 20. | Heat conduction in glass is due to: | programme to the second second | |
| | (1) Electromagnetic waves | | |
| | (2) Elastic impact of molecules | | |
| | (3) Motion of electrons | | |
| | (4) Mixing motion of different layers of | f gas | |
| | | | |
| 21. | A keto acid involved in carbohydrate me | etabolism is: | |
| | (1) Citric acid | (2) Pyruvic acid | |
| | (3) Succinic acid | (4) Tricarboxylic acid | |
| 22. | Carbohydrate free human diet leads to: | | |
| | (1) Addition's disease | (2) Hyper adrenalism | |
| | (3) Hypothyroidism | (4) Ketosis | |

| | | toing in plants are: |
|-----|--|--|
| 23. | The most common simple proteins which act as reserve proteins in plants are: | |
| 2.5 | (1) Albumins | (2) Globulins |
| | (3) Glutelins | (4) Prolamins |
| | | e replaced by 100 parts of the protein fed in the |
| 24. | The parts of the body protein that can be | e replaced by too participation of the second of the secon |
| | test is known as: | |
| | (1) Biological value | |
| | (2) Chemical score | |
| | (3) Digestibility coefficient | |
| | (4) Protein Efficiency Ratio | |
| | | 3. 24 May 7 May 1 May 1 May 2 May 1 |
| 25. | Riboflavin is rapidly destroyed in: | |
| | (1) Acid medium | |
| | (2) Alkaline medium | Landson Training |
| | (3) Neutral medium | 14 - 414 477 48 - 4" |
| | (4) All the above | |
| | | to the control of the |
| 26. | Consumption of raw eggs by adults may | y lead to . |
| | (1) Biotin deficiency | en the second second second |
| | (2) Calcium deficiency | |
| | (3) Folic acid deficiency | |
| | (4) Phosphorus deficiency | |

| 27. | Monosaccharides constituting factose | are: | |
|-----|---|------------------|---------------------|
| | (1) Galactose-galactose | | |
| | (2) Galactose-glucose | | |
| , , | (3) Glucose-glucose | | July Var A Del |
| | (4) Glucose-fructose | | |
| 28. | Differential speed ratio of the pairs of | break rolls of B | uhler mill is: |
| | (1) 3:1 | (2) 2.5:1 | and Alakin |
| | (3) 1.5:1 | (4) 1:1 | av istaa T |
| 29. | One refrigeration ton is equivalent to: | | gu Efvetki |
| | (1) 1000 kg/day | N and | nathan ber |
| | (2) 1000 Btu/day | | a strandiland |
| | (3) 12000 kg/hour | | molen brought |
| | (4) 12000 Btu/hour | | |
| 30. | Cleaning of cereals by aspiration is base | ed on : | en las rollinges er |
| | (1) Aerodynamic properties | | A TAL ANTEN |
| | (2) Hydrodynamic properties | | the application |
| | (3) Magnetic properties | | |
| | (4) Thermal properties | | |
| | | | |

| 31. | Which one of the following cannot be the unit of convective heat transfer coefficient? | |
|------|--|--|
| | (1) $W/m^2.K$ (2) $kW/m^2.K$ | |
| | (3) Btu/ft³.h.°C (4) kcal/m².h.°C | |
| 32. | The emissive power of a body depends on: | |
| | (1) Nature of body (2) Physical nature | |
| | (3) Temperature of body (4) All of the above | |
| 33. | Licensing and registering authority have the power to | |
| | (1) Registration (2) Licensing | |
| | (3) Cancellation of License (4) All of the above | |
| 34. | The Global Food Safety Initiative was created by the: | |
| | (1) Food and Drug Administration | |
| | (2) British Retail Consortium (BRC) | |
| HTP. | (3) Global Food Business Forum | |
| | (4) World Health Organization (WHO) | |
| 35 | i. In a concentric double pipe heat exchanger one fluid undergoes phase change: | |
| | (1) Two fluids should opposite to each other | |
| | (2) Two fluids should flow parallel to each other | |
| | (3) Two fluids should flow normal to each other | |
| | (4) The direction of flow of the two fluids are of no consequences | |

| 36. | For a perfectly black body: (1) $\alpha = 1$, $\varepsilon = 0$, $\tau = 0$ (2) $\alpha = \varepsilon = 0$, $P = 1$ (3) $\alpha = \tau = 0$, $\varepsilon = 1$ (4) None of these For laminar flow (in flow inside pipes) Sherwood number shows the same trends as: (1) Nusselt number (2) Reynolds number (3) Stanton number (4) Prandtl number |
|-----|---|
| 38. | Effect of temperature on the reaction rate is given by: (1) Arrhenius equation (2) Gibbs Helmholtz equation (3) Kirchoff's law (4) None of the above |
| 39. | Which of the following is <i>true</i> about ISO 2002 method for Salmonella detection? |
| | Selenite cystine (SC) broth is replaced by Muller Kauffmann tetrathionate novobiocin broth (MKTTn) Rappaport Vassiliadis (RV) broth has been replaced by Rappaport Vassiliadis Soya |
| | (RVS broth |
| | (3) XLD is the first isolation medium rather than BGA (4) All of these (4) All of these |
| 40. | What are the intrinsic factors for the microbial growth? |
| | (1) pH |
| | (3) Oxidation-Reduction Potential (4) All of these |

- plank's equation describing freezing of food was derived from a few assumptions and the following was **not** one of these assumptions:
 - (1) Pseudo-steady state condition
 - (2) A definite freezing point
 - (3) Freezing starts at the freezing point
 - (4) None of the above
- 42. Temperature commonly used for air freezing is:
 - (1) -23°C to -30°C

(2) -180C to -40°C

(3) -40°C to -42°C

- (4) 23°C to 30°C
- 43. Coefficient of performance of a refrigerator is given by:
 - (1) Heat removed by the evaporator divided by the heat rejected by the condenser
 - (2) Heat removed by the evaporator divided by the compressor work
 - (3) Heat rejected by the condenser divided by compressor work
 - (4) None of the above
- 44. Pick out the correct relationship between Ri (internal reflux ratio) and Ro (external reflux ratio):
 - (1) (1+Ro)=Ro/Ri

(2) (1-Ro)=Ro/Ri

(3) (1+Ro)=Ro/Ri

(4) (1–Ri)=Ro/Ri

| 45. | 45. In case of gases, the binary diffusivity is propo | ortional to (where p=pressure); |
|-----------------|---|--|
| | (1) p (2) 1 | /p |
| | (3) 1√p (4) √ | p = 1 = (1 |
| 46. | extraction, as the temperature increases, the | e area of heterogeneity (area covered |
| | binodal curve): | |
| | (1) Decreases (2) In | acreases |
| | (3) Remain unchanged (4) N | one of these |
| 47. | 7. Azeotropic distillation is employed to separate: | > 100 E 31 |
| | (1) Constant boiling mixture | The west of the Production |
| | (2) High boiling mixture | |
| | (3) Mixture with very high relative volatility | and the terms of the second of |
| | (4) Heat sensitive materials | The transferred least right |
| 1 8. | and non dimensional number of mass transfer w | |
| | Schmidt number is: | gue e ja lagn bold f. |
| | (1) Sherwood number (2) Lev | wis number |
| | (3) Nusselt number (4) Gra | ates number |
| 9. | 9. In which model, monolayer value comes into fun | ection: |
| MAN STATE | (1) BET model (2) Kel | lvin model |
| | (3) GAB model (4) Her | nderson model |

| 50. | Constant rate of drying is directly proportional to: | |
|-----|---|---|
| | (1) Convective heat transfer coefficient | |
| | (2) Latent heat of vaporization | |
| | (3) Wet bulb temperature | |
| | (4) None of the above | |
| 51. | . Particle density of an agricultural produ | ice is 1.95 g/cc. The porosity of the bulk is |
| | 36 %. The bulk density of the produce is | : |
| | (1) 1.10 | (2) 1.25 |
| | (3) 1.75 | (4) 1.85 |
| 52. | . Which one is a faster method for separating solid particles from a mixture of solids? | |
| | (1) Aspiration | (2) Cyclone separation |
| | (3) Centrifugal separation | (4) Fluidization |
| 53. | 3. The higher values of angle of internal fri | ction indicate that the material is: |
| | (1) Cohesive | (2) Easy flowing |
| | (3) Free flowing | (4) None of these |
| 54. | 4. The differential speed of rolls used in w | heat mill is : |
| | (1) 1.5:1 | (2) 2.5:1 |
| | (3) 45 · 1 | (4) 25.1 |

| 12 | | the second |
|-----|---|--|
| 55. | . Which of the following law is used | to predict energy requirement for grinding |
| | material ? | (2) Newton's law |
| | (1) Recult's law | |
| | (3) Kick's law | (4) Stoke's law |
| 56. | Moisture content of wheat on dry basis | is 25%, what will be on wet basis ? |
| ٠٠. | (1) 20% | (2) 28% |
| | (3) 24% | (4) 26% |
| | | p between the concentration of bactericide |
| 57. | Watson law, which gives a relationshi and the time necessary to accomplish a | standard destruction, is given by: |
| | (1) Ct = constant | (2) $C/t = constant$ |
| | (3) $C^2t = constant$ | (4) $C^n t = constant$ |
| 58. | Transmittance properties of food materi | al are used to indicate: |
| | (1) Extent of processing in biscuits | |
| | (2) Core defects in fruits | |
| | (3) Bruised fruits | |
| | (4) All of these | |
| 59. | During the discharge of the solids of bin | s and hoppers, the angle comes into play is: |
| | (1) angle of friction | |
| | (2) dynamic angle of friction | |
| | (3) angle of repose | |
| | (4) angle of rotation | |

Dielectric constant of a food material depends upon ; 60.

(1) Temperature

(2) Moisture content

(3) Density

(4) Electrical conductivity

Infrared wavelength is represented by which of the following?

- (1) 10⁻⁴ cm
- (2) 10⁻⁵ cm

 (4) 10⁻² cm
- (3) 10⁻⁶ cm

Which of the following methods can't be used to calculate thermal process time?

(1) General method

(2) Runga- Kutta method

(3) Formula method

(4) Hayakawa method

If the value of Z is around 115°C, then Q₁₀ will be from the state of the state o

- 4 1 . m. merali, a diament (2) 2.11
- the partition of the allegange of the large and the second by a second of maintains.
 - (4) 5.18

Thermal death time model equations for microbial inactivation at different temperatures can be expressed as:

- (1) $\log \frac{F}{F_0} = \frac{T T_0}{Z}$ (2) $\log \frac{D}{D_0} = \frac{T T_0}{Z}$

(3) $\log \frac{t_0}{t_T} = -\frac{T - T_0}{Z}$

(4) All of these

| 65. | Kg of steam/kg of water vapour remove | d in an evaporator is called: |
|----------------|--|---|
| | (1) Efficiency | (2) Effectiveness |
| | (3) Steam use ratio | (4) Specific steam consumption |
| | Migratusian kedalati. | |
| 66. | Radiation heat transfer is characterized | by: |
| | (1) Energy transport as a result of bulk | fluid motion |
| | (2) Thermal energy transfer as vibration | nal energy in the lattice structure of the material |
| | (3) Movement of discrete packets of en | ergy as electromagnetic wanes |
| | (4) Circulation of fluid motion depends | on buoyancy effects |
| 67. | The time temperature combination for selected on the basis of: | HTST pasteurization of 71.1°C for 15 sec is |
| | (1) Coxiella burnetii | (2) E. coli |
| | (3) B. subtilis bodgen manhogett the | (4) C. botulinum |
| 68. | Stationary phase is described as | Dien Gebergen von Stander in 1975. |
| 00. | (1) no further increase in the cell popul | |
| | CA | 40 2 1/ |
| | (2) deceleration of growth and division rate after the growth rate reaches a maxim | |
| | | rate after the growth rate reaches a maximum |
| 建 版 5/1 | (4) deceleration of growth and division | rate after the growth rate reaches a minimum |
| 69. | The function of the disengagement zone | in an airlift fermenter is to: |
| | (1) prevent CO ₂ rich bubbles from enter | ring the downcomer |
| | (2) reduce the velocity of the bubbles | |
| | (3) reduce liquid loss as aerosols | *** *** *** *** *** *** *** *** *** ** |
| | (4) all of the above | |
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| 70. | The monod model predicts that the specific growth rate: | |
|-----|--|---|
| | (1) will decrease with the conc. of the growth limiting substrate | |
| | (2) will increase with the conc. of the growth limiting substrate until it reaches maximum value | |
| | (3) will increase with the conc. of the gr | owth limiting substrate |
| | (4) does not depend on growth limiting | the Maria and the second |
| 71. | Among the following which group of fat | |
| | (1) Oleic, Linoleic | (2) Butyric, Lauric |
| | (3) Caproic, Butyric | (4) Styrene, Lauric |
| 72. | When vapor pressure of water at surface | is more than vapor pressure of atmosphere: |
| | (1) Water starts boiling | (2) Water escapes |
| | (3) No effect | (4) None of the above |
| 73. | Which is major phenol substrate for phe | nolase action in enzymatic browning reaction? |
| | (1) Caffeic acid | (2) Chlorogenic acid |
| | (3) Phenol oxidase | (4) Tyrosine |
| 74. | Phenomenon of osmosis causes membrane. | of true liquid separated by chemical |
| | (1) Change in relative density | |
| | (2) Change in specific gravity | allower as all lighty the event for a |
| | (3) Change in relative volume | man value in the |
| | (4) Change in relative viscosity | |
| PHD | URS-EE-2022/(Food Tech.)(SET-Y)/(C |). 1 - 1 - P. T. O. |

| | (1) Vapor pressure of solid | |
|--------------|--|--|
| | (2) Vapor pressure of atmosphere | The second of th |
| | (3) Vapor pressure of liquid (4) None of the above | |
| 76. | The final browning pigment of enzyma | tic browning reaction is: |
| | (1) Melanin | (2) O-diphenol |
| | (3) Orthoquinone | (4) Caffeic acid |
| 77. | Water activity of the solution having lov | w solute concentration can be obtained from: |
| | $(1) \ \mathbf{a_w} = \mathbf{X_w}$ | $(2) \ a_{w} = LN \ X_{w}$ |
| | (3) $LN_{aw} = X_w$ | (4) $a_w = 1/X_w$ |
| 78. | Water can be best described as: | elda oli varetie v joaj je sva vodij≇e vod |
| | (1) Pseudoplastic, Thixotropic | and the second of the second |
| | (2) Dilatent, Rheopectic | |
| le, ol ettei | (3) Dilatent, Pseudoplastic | tan si maya. Nyan ilay kambi |
| | (4) Newtonian | |
| 79. | Freeze burn is a defect which generally | occurs in frozen foods due to: |
| | (1) Dehydration | (2) Osmosis |
| | (3) Thermal conductivity | (4) Rehydration |
| PHD/ | URS-EE-2022/(Food Tech.)(SET-Y)/(C |) in the second of the second |

A liquid freeze when its vapor pressure is equal to:

F. T. O.

| 80. | Most commonly used material for microwave oven packaging is made up of : | |
|-----|---|--------------------------------------|
| | (1) Wood | (2) Paper |
| | (3) Plastic | (4) Aluminum foil |
| 81. | The application of filter(s) in the image | analysis is: |
| | (1) to remove unwanted noise | |
| | (2) to sharpen the edges of objects | |
| | (3) Both above | |
| | (4) None of the above | |
| 82. | With most modern equipment, | gray levels are available. |
| | (1) 255 | (2) 256 |
| | (3) 251 | (4) 225 |
| 83. | In a typical image having dimensions of 512 pixels X 512 pixels, each pixel has an integer value ranging: | |
| | (1) From 100 to 1000 | (2) From 0 to 100 |
| | (3) From 0 to 255 | (4) From 0 to 521 |
| 84. | In binarization, the original gray level in | nage is changed from a continuum of: |
| | (1) Colours or gray levels into a black a | nd white image |
| | (2) Black and white levels into a colour | image |
| | (3) Black level into a colour image | |
| | (4) White level into a colour image | |

| B5. | The mechanism of elastic can be describ | ed by: |
|-----|--|--|
| | (1) Einstein theory | (2) Rubber elasticity theory |
| | (3) Plastic resilience system | (4) None of the above |
| 86. | The ability of two materials to resist sep | paration after their surfaces come into contact is |
| | known as: | en i i i de la compania de la compa |
| | (1) Cohesion | (2) Tack |
| | (3) Adhesion | (4) Stickiness |
| 87. | Low values for the second | no e la casa de la cas |
| 07. | Low values for the surface energy of the | e solid means : |
| | (1) Low adhesion | (2) High adhesion |
| | (3) Low cohesion | (4) High cohesion |
| 88. | Differential Scanning Calorimetry is a t | echnique to measure : |
| | (1) Electrical conductivity | (2) Impact energy |
| | (3) Thermal expansion | (4) Specific heat |
| 89. | Kind of electron microscope which is u | sed to study internal structure of cells is: |
| | (1) scanning electron microscope | |
| | (2) transmission electron microscope | |
| | (3) light microscope | |
| | (4) compound microscope | |

| 90. | Electrons of Scanning Electron Microscope are reflected through; | | |
|-----|---|-------------------------|--|
| | (1) glass funnel | (2) specimen | |
| | (3) metal-coated surfaces | (4) vacuum chamber | |
| 91. | Alcohol ppt. test determines: | | |
| | (1) Adulteration of milk | | |
| | (2) Percentage of fat in milk | | |
| | (3) Milk acidity | | |
| | (4) Heat stability of milk | | |
| 92. | Food that exhibits Newtonian flow behaviour best among the following is: | | |
| | (1) Dairy cream | (2) Fruit purees | |
| | (3) Milk | (4) Protein concentrate | |
| 93. | Permeability of plastic packaging films to gases is given by: | | |
| | (1) Bear's law | (2) Fick's law | |
| | (3) Fink's law | (4) Flemming's law | |
| 94. | Rate of sedimentation of particles during fruit juice clarification is governed by: | | |
| | (1) Fick's law | (2) Kick's law | |
| | (3) Ostwald's law | (4) Stoke's law | |

| 95. | Working fluid employed in heat pump cycle is: | | |
|------|--|--|--|
| | (1) Ammonia gas | (2) Freon gas | |
| | (3) Steam | (4) Hot water | |
| 96. | The relationship between moisture conte | ent and water activity of foods is given by: | |
| | (1) BET equation | (2) Fourier's equation | |
| | (3) Stefan's Law | (4) Plank's equation | |
| 97. | The pigments responsible for the red and | d purple colour of fruits and vegetables are | |
| | (1) Myoglobin | (2) Oxymyoglobin | |
| | (3) Anthocyanins | (4) Pheophytins | |
| 98. | The sole pigments in vegetables such as | potato and yellow skinned onion are: | |
| | (1) Myoglobin | (2) Anthocyanins | |
| | (3) Pheophytins | (4) Flavonoids | |
| 99. | The delayed bitterness in oranges and grapefruits is due to: | | |
| | (1) Terpene limonin | (2) Hesperidin | |
| | (3) Allicin | (4) Naringin | |
| 00. | The most common flavonoid in the peel | s of oranges and lemons is: | |
| ٠,٠. | (1) Terpene limonin | (2) Hesperidin | |
| | (3) Allicin | (4) Naringin | |
| | 7-7 | | |

Total No. of Printed Pages: 21

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D

Ph.D./URS-EE-Jan-2022

SUBJECT: Food Technology

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|------------------------------|----------------------|--------------------------------|
| | | Sr. No |
| Time: 11/4 Hours | Max. Marks: 100 | Total Questions: 100 |
| Roll No. (in figures) | (in words) | |
| Name | Father's Name | |
| Mother's Name | Date of Examination_ | |
| | | |
| (Signature of the Candidate) | | (Signature of the Invigilator) |

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- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

| 1. | A keto acid involved in carbohydrate r | netaholism is - |
|--|--|--|
| | (1) Citric acid | (2) Pyruvic acid |
| | (3) Succinic acid | (4) Tricarboxylic acid |
| 2. | Carbohydrate free human diet leads to | |
| | (1) Addition's disease | (2) Hyper adrenalism |
| | (3) Hypothyroidism | (4) Ketosis |
| 3. The most common simple proteins which act as reserve proteins in plants are | | hich act as reserve proteins in plants are |
| | (1) Albumins | (2) Globulins |
| | (3) Glutelins | (4) Prolamins |
| 4. | test is known as : | n be replaced by 100 parts of the protein fed in |
| | (1) Biological value (2) Chemical score | |
| | (3) Digestibility coefficient (4) Protein Efficiency Ratio | |
| 5. | Riboflavin is rapidly destroyed in: | |
| | (1) Acid medium | |
| | (2) Alkaline medium | |
| | (3) Neutral medium | |
| | (4) All the above | |
| | | |

| 6 | Consumption of raw eggs by adults may lead to: |
|----|--|
| | (1) Biotin deficiency |
| | (2) Calcium deficiency |
| | (3) Folic acid deficiency |
| | (4) Phosphorus deficiency |
| 7 | Managarah 'I |
| 7. | Monosaccharides constituting lactose are : |
| | (1) Galactose-galactose |
| | (2) Galactose-glucose |
| | (3) Glucose-glucose |
| | (4) Glucose-fructose |
| 8. | Differential speed ratio of the pairs of break rolls of Buhler mill is : |
| | (1) 3:1 (2) 2.5:1 |
| | (3) 1.5:1 |
| 9. | One refrigeration ton is equivalent to: |
| | (1) 1000 kg/day |
| | (2) 1000 Btu/day |

(3) 12000 kg/hour

(4) 12000 Btu/hour

| 10. | Cleaning of cereals by aspiration is based on: | |
|-----|---|--|
| | (1) Aerodynamic properties | |
| | (2) Hydrodynamic properties | |
| | (3) Magnetic properties | |
| | (4) Thermal properties | |
| 11. | Which one of the following cannot be the unit of convective heat transfer coefficient | |
| | (1) W/m ² .K | (2) kW/m ² .K |
| | (3) Btu/ft ³ .h.°C | (4) kcal/m ² .h.°C |
| . 9 | As a second production of the second | term short our an with amount at 150 |
| 12. | 2. The emissive power of a body depends on: | |
| | (1) Nature of body | (2) Physical nature |
| | (3) Temperature of body | (4) All of the above |
| 13. | Licensing and registering authority have the power to | |
| | (1) Registration | (2) Licensing |
| | (3) Cancellation of License | (4) All of the above |
| 14. | The Global Food Safety Initiative was o | reated by the: |
| | (1) Food and Drug Administration | |
| | (2) British Retail Consortium (BRC) | |
| | (3) Global Food Business Forum | |
| | (4) World Health Organization (WHO) | and the Leavest and the Leaves |

- 15. In a concentric double pipe heat exchanger one fluid undergoes phase change:
 - (1) Two fluids should opposite to each other
 - (2) Two fluids should flow parallel to each other
 - (3) Two fluids should flow normal to each other
 - (4) The direction of flow of the two fluids are of no consequences
- **16.** For a perfectly black body:

(1) $\alpha = 1$, $\epsilon = 0$, $\tau = 0$

(2) $\alpha = \varepsilon = 0$, P = 1

(3) $\alpha = \tau = 0$, $\varepsilon = 1$

(4) None of these

17. For laminar flow (in flow inside pipes) Sherwood number shows the same trends as:

(1) Nusselt number

(2) Reynolds number

(3) Stanton number

(4) Prandtl number

18. Effect of temperature on the reaction rate is given by:

(1) Arrhenius equation

(2) Gibbs Helmholtz equation

(3) Kirchoff's law

(4) None of the above

- 19. Which of the following is true about ISO 2002 method for Salmonella detection?
 - (1) Selenite cystine (SC) broth is replaced by Muller Kauffmann tetrathionate novobiocin broth (MKTTn)
 - (2) Rappaport Vassiliadis (RV) broth has been replaced by Rappaport Vassiliadis Soya (RVS broth
 - (3) XLD is the first isolation medium rather than BGA
 - (4) All of these

- 20. What are the intrinsic factors for the microbial growth?
 - (1) pH
 - (2) Moisture
 - (3) Oxidation-Reduction Potential
 - (4) All of these
- 21. Plank's equation describing freezing of food was derived from a few assumptions and the following was *not* one of these assumptions:
 - (1) Pseudo-steady state condition
 - (2) A definite freezing point
 - (3) Freezing starts at the freezing point
 - (4) None of the above
- 22. Temperature commonly used for air freezing is:
 - (1) -23°C to -30°C

(2) -180C to -40°C

(3) -40°C to -42°C

- (4) 23°C to 30°C
- 23. Coefficient of performance of a refrigerator is given by:
 - (1) Heat removed by the evaporator divided by the heat rejected by the condenser
 - (2) Heat removed by the evaporator divided by the compressor work
 - (3) Heat rejected by the condenser divided by compressor work
 - (4) None of the above

| 0 | seletionship betwee | n Ri (internal reflux ratio) and Ro (external |
|------|--|---|
| 24. | reflux ratio): | |
| | (1) (1+Ro)=Ro/Ri | (2) (1–Ro)=Ro/Ri |
| | (3) (1+Ro)=Ro/Ri | (4) (1–Ri)=Ro/Ri |
| 25. | In case of gases, the binary diffusivity is p | proportional to (where p=pressure): |
| 25. | | (2) 1/p |
| | | (4) √p |
| 26. | . In extraction, as the temperature increases, the area of heterogeneity (area covered by | |
| | binodal curve): | (2) Increases |
| | (1) Decreases(3) Remain unchanged | (4) None of these |
| 27. | Azeotropic distillation is employed to se | parate: |
| | (1) Constant boiling mixture | |
| | (2) High boiling mixture | |
| | (3) Mixture with very high relative vola | tility |
| | (4) Heat sensitive materials | |
| 28. | 8. The non-dimensional number of mass transfer which is function of Prandtl number as Schmidt number is: | |
| | (1) Sherwood number | (2) Lewis number |
| | (3) Nusselt number | (4) Grates number |
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| 29. | In which model, monolayer value comes into function: | | |
|------|--|-----------------------------------|--|
| | (1) BET model | (2) Kelvin model | |
| | (3) GAB model | (4) Henderson model | |
| | | | |
| 30. | Constant rate of drying is directly proportional to: | | |
| | (1) Convective heat transfer coefficient | | |
| | (2) Latent heat of vaporization | | |
| | (3) Wet bulb temperature | | |
| | (4) None of the above | | |
| - | YGG 0001 0000 : | 100 | |
| 31. | ISO 9001:2008 is an update of an earlier | 150: | |
| | (1) ISO 9000:2005 | (2) ISO 9001:2000 | |
| | (3) ISO 9000:2000 | (4) ISO 9004:2000 | |
| 32. | The eight quality management principles | s are defined in : | |
| JZ. | The eight quanty management principle. | | |
| | (1) ISO 9000:2000 | (2) ISO 9004:2000 | |
| | (3) ISO 9000:2005 | (4) Both (1) & (2) | |
| 33. | The primary function of a QA departme | nt is to provide confidence for ? | |
| | | | |
| | (1) Supplier | | |
| | (2) Retailer | | |
| | (3) Management and Consumer | | |
| | (4) Wholesaler | | |
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| 34. | Good manufacturing practice means und | erstanding, analyzing and controlling the: | |
|------|---|--|--|
| | (1) The manufacturing process | (2) Laboratory | |
| | (3) Distribution of food | (4) None of the above | |
| 35. | What is the purpose of FSMS (Food Safe | ety Management System) ? | |
| | (1) To ensure the storage, distribution a | nd sale of safe food. | |
| | (2) To ensure the manufacture, distribut | ion and sale of safe food. | |
| | (3) To ensure the manufacture, storage | | |
| | (4) To ensure the manufacture, storage, distribution and sale of safe food. | | |
| 36. | Molecular sieves are regenerated by hea | ating to: | |
| | (1) <150°C | (2) >500°C | |
| | (3) 200-330°C | (4) >1000°C | |
| 37. | According to Poiseuille's law, the permeability for gas flow through a capillary proportional to $(\mu = \text{gas viscosity})$: | | |
| | (1) µ | (2) 1/µ | |
| | (3) √μ | (4) μ^2 | |
| 38. | Particle density of an agricultural pro- | oduce is 1.95 g/cc. The porosity of the bulk | |
| | 36%. The bulk density of the produce is: | | |
| | (1) 1.10 | (2) 1.25 | |
| | (3) 1.75 | (4) 1.85 | |
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| 39. | The ratio between apertures in consecuti | ve screen in Tyler series is: | |
|-------|--|---|----------|
| | (1) 2 | (2) 21/2 | |
| | (3) 2 ^{1/4} | (4) Both (2) and (3) | |
| 40. | Angle of nip is formed by the : | | |
| | (1) particle to be ground with the roll | | |
| | (2) tangents to the roll faces at the point | of contact between a particle and rolls | |
| | (3) heap of material in free fall to the ro | lls | |
| | (4) None of these | | |
| 41. | The characteristic odour of garlic is due | to: | |
| | (1) Naringin | (2) Allicin | |
| | (3) Hesperidin | (4) Thioglucosides | |
| 42. | The flavour components of the cabbage | and cauliflower are due to: | |
| | (1) Naringin | (2) Allicin | |
| | (3) Hesperidin | (4) Thioglucosides | |
| 43. | The formation of brown colour in fruits following enzyme on phenolic substance | | tion of |
| | (1) Tyrosinase | (2) Amylase | |
| | | | |
| | (3) Phenolase | (4) Peroxidase | |
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| 44. | The enzyme which hydrolyzes sucrose i | nto glucose and fructose is: |
|-------|---|---|
| | (1) α-amylase | (2) β-amylase |
| | (3) Cellulase | (4) Invertase |
| | | and using : |
| 45. | The haziness noticed in fruit juices and | wines can be removed using. |
| | (1) Cellulase | (2) Pectinase |
| | (3) Invertase | (4) α-amylase |
| 46. | The enzyme which decomposes hydroge | en peroxide to water is: |
| | (1) Cellulase | (2) Lipase |
| | (3) Catalase | (4) α-amylase |
| | | |
| 47. | The enzyme which bleaches the flour to | produce a very white crumb is: |
| | (1) Invertase | (2) Lipoxygenases |
| | (3) Catalase | (4) Pectinase |
| 48. | A male of non-ionizing solute in a liture | |
| 40. | A mole of non-ionizing solute in a fifre of | of water depresses its freezing point by: |
| | (1) 5.58°C | (2) 3.72°C |
| | (3) 2.24°C | (4) 1.80°C |
| 49. | The gas used for flushing the processed a | and packaged food is |
| | (1) Hydrogen | (2) Nitrogen |
| | (3) Carbon dioxide | (4) Oxygen |
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| 50. | Heat conduction in glass is due to: | |
|-------|--|--|
| | (1) Electromagnetic waves | |
| | (2) Elastic impact of molecules | |
| | (3) Motion of electrons | |
| | (4) Mixing motion of different layers of | of gas |
| 51. | Among the following which group of fa | at is unsaturated ? |
| | (1) Oleic, Linoleic | (2) Butyric, Lauric |
| | (3) Caproic, Butyric | (4) Styrene, Lauric |
| 52. | When vapor pressure of water at surface | e is more than vapor pressure of atmosphere: |
| | (1) Water starts boiling | (2) Water escapes |
| | (3) No effect | (4) None of the above |
| 53. | Which is major phenol substrate for phe | enolase action in enzymatic browning reaction? |
| | (1) Caffeic acid | (2) Chlorogenic acid |
| | (3) Phenol oxidase | (4) Tyrosine |
| 54. | Phenomenon of osmosis causes membrane. | of true liquid separated by chemical |
| | (1) Change in relative density | |
| | (2) Change in specific gravity | |
| | (3) Change in relative volume | |
| | (4) Change in relative viscosity | |
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| 55. | A liquid freeze when its vapor pressure is equal to: | | | |
|-----|--|--|--|--|
| | (1) Vapor pressure of solid | | | |
| | (2) Vapor pressure of atmosphere | | | |

(4) None of the above

(3) Vapor pressure of liquid

56. The final browning pigment of enzymatic browning reaction is:

(1) Melanin

(2) O-diphenol

(3) Orthoquinone

(4) Caffeic acid

57. Water activity of the solution having low solute concentration can be obtained from:

$$(1) \ a_w = X_w$$

(2)
$$a_w = LN X_w$$

(3)
$$LN_{aw} = X_w$$

(4)
$$a_w = 1/X_w$$

58. Water can be best described as:

(1) Pseudoplastic, Thixotropic

(2) Dilatent, Rheopectic

(3) Dilatent, Pseudoplastic

(4) Newtonian

59. Freeze burn is a defect which generally occurs in frozen foods due to:

(1) Dehydration

(2) Osmosis

(3) Thermal conductivity

(4) Rehydration

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| 6 | 0. Most commonly used n | naterial for microwave oven packaging is made up of : |
|-------|----------------------------|--|
| | (1) Wood | (2) Paper |
| | (3) Plastic | (4) Aluminum foil |
| 61 | . Alcohol ppt. test determ | ines: |
| | (1) Adulteration of milk | |
| | (2) Percentage of fat in | milk |
| | (3) Milk acidity | |
| | (4) Heat stability of mil | k |
| 62. | Food that exhibits Newto | onian flow behaviour best among the following is: |
| | (1) Dairy cream | (2) Fruit purees |
| | (3) Milk | (4) Protein concentrate |
| 63. | Permeability of plastic po | ackaging films to gases is given by: |
| | (1) Bear's law | (2) Fick's law |
| | (3) Fink's law | (4) Flemming's law |
| 64. | Rate of sedimentation of | particles during fruit juice clarification is governed by: |
| | (1) Fick's law | (2) Kick's law |
| | (3) Ostwald's law | (4) Stoke's law |
| 65. | Working fluid employed i | n heat pump cycle is : |
| | (1) Ammonia gas | (2) Freon gas |
| | (3) Steam | (4) Hot water |
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| 14 | | and water activity of foods is given by: |
|-----|---|---|
| 66. | The relationship between moisture con- | tent and water activity of foods is given by: (2) Fourier's equation |
| | (1) BET equation | (4) Plank's equation |
| | (3) Stefan's Law | |
| 67. | The pigments responsible for the red a | nd purple colour of fruits and vegetables are: |
| | (1) Myoglobin | (Z) Oxymy z |
| | (3) Anthocyanins | (4) Pheophytins |
| | The improvement in vegetables such | as potato and yellow skinned onion are: |
| 68. | | (2) Anthocyanins |
| | (1) Myoglobin(3) Pheophytins | (4) Flavonoids |
| 60 | 1 hittorness in oranges and | l grapefruits is due to : |
| 69. | (1) Terpene limonin | (2) Hesperidin |
| | (3) Allicin | (4) Naringin |
| 70. | The most common flavonoid in the p | peels of oranges and lemons is: |
| 70. | (1) Terpene limonin | (2) Hesperidin |
| | (3) Allicin | (4) Naringin |
| 71. | The application of filter(s) in the im | age analysis is: |
| | (1) to remove unwanted noise | |
| | (2) to sharpen the edges of objects | |
| | (3) Both above | |
| | (4) None of the above | |
| | (4) Will of the acc. | |

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| 72. | With most modern eq | uipment, | . gray levels are available. | |
|-------|---------------------------------------|-----------------------|---|----|
| | (1) 255 | | (2) 256 | |
| | (3) 251 | | (4) 225 | |
| 73. | In a typical image ha | | of 512 pixels X 512 pixels, each pixel has an | 1 |
| | (1) From 100 to 1000 |) | (2) From 0 to 100 | |
| | (3) From 0 to 255 | | (4) From 0 to 521 | |
| 74. | In binarization, the or | riginal gray level in | nage is changed from a continuum of: | |
| | (1) Colours or gray le | evels into a black ar | nd white image | |
| | (2) Black and white I | levels into a colour | image | |
| | (3) Black level into a | colour image | | |
| | (4) White level into a | a colour image | | |
| 75. | The mechanism of ela | astic can be describ | ped by : | |
| | (1) Einstein theory | | (2) Rubber elasticity theory | |
| | (3) Plastic resilience | system | (4) None of the above | |
| 76. | The ability of <i>two</i> maknown as: | terials to resist sep | paration after their surfaces come into contact | is |
| | (1) Cohesion | | (2) Tack | |
| | (3) Adhesion | | (4) Stickiness | |
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| | | | | |

| 77. | Low values for the surface energy of the | e solid means : |
|-----|---|---|
| | (1) Low adhesion | (2) High adhesion |
| | (3) Low cohesion | (4) High cohesion |
| 78. | Differential Scanning Calorimetry is a to | echnique to measure: |
| | (1) Electrical conductivity | (2) Impact energy |
| | (3) Thermal expansion | (4) Specific heat |
| 79. | Kind of electron microscope which is us | ed to study internal structure of cells is: |
| | (1) scanning electron microscope | |
| | (2) transmission electron microscope | |
| | (3) light microscope | |
| | (4) compound microscope | |
| 80. | Electrons of Scanning Electron Microsco | ope are reflected through: |
| | (1) glass funnel | (2) specimen |
| | (3) metal-coated surfaces | (4) vacuum chamber |
| 81. | Particle density of an agricultural prod | uce is 1.95 g/cc. The porosity of the bulk |
| | 36 %. The bulk density of the produce is | |
| | (1) 1.10 | (2) 1.25 |
| | (3) 1.75 | (4) 1.85 |
| | | |

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| 82 | Which one is a faster method for separating solid particles from a mixture of solids? | | | |
|-------|---|--|--|--|
| | (1) Aspiration | (2) Cyclone separation | | |
| | (3) Centrifugal separation | (4) Fluidization | | |
| 83 | . The higher values of angle of int | ernal friction indicate that the material is: | | |
| | (1) Cohesive | (2) Easy flowing | | |
| | (3) Free flowing | (4) None of these | | |
| 84. | The differential speed of rolls use | ed in wheat mill is: | | |
| | (1) 1.5:1 | (2) 2.5:1 | | |
| | (3) 4.5:1 | (4) 3.5:1 | | |
| 85. | Which of the following law is material? | used to predict energy requirement for grinding a | | |
| | (1) Raoult's law | (2) Newton's law | | |
| | (3) Kick's law | (4) Stoke's law | | |
| 86. | Moisture content of wheat on dry | basis is 25%, what will be on wet basis? | | |
| | (1) 20% | (2) 28% | | |
| | (3) 24% | (4) 26% | | |
| 87. | Watson law, which gives a relat | ionship between the concentration of bactericide 'C' | | |
| | and the time necessary to accomp | lish a standard destruction, is given by: | | |
| | (1) Ct = constant | (2) $C/t = constant$ | | |
| | (3) $C^2t = constant$ | (4) $C^n t = constant$ | | |
| PHD/U | JRS-EE-2022/(Food Tech.)(SET- | Y)/(D) P. T. O | | |
| | | | | |

| 88. Transmittance properties of food n | naterial are used to indicate : |
|--|--|
| (1) Extent of processing in biscuit | |
| (2) Core defects in fruits | |
| (3) Bruised fruits | |
| (4) All of these | |
| 89. During the discharge of the solids | of bins and hoppers, the angle comes into play |
| (1) angle of friction | (2) dynamic angle of friction |
| (3) angle of repose | (4) angle of rotation |
| 90. Dielectric constant of a food mate | erial depends upon : |
| (1) Temperature | (2) Moisture content |
| (3) Density | (4) Electrical conductivity |
| 91. Infrared wavelength is represente | ed by which of the following? |
| $(1) 10^{-4} \text{ cm}$ | $(2) 10^{-5} \text{ cm}$ |
| (3) 10 ⁻⁶ cm | $(4) 10^{-2} \text{ cm}$ |
| 92. Which of the following methods | can't be used to calculate thermal process time? |
| (1) General method | (2) Runga- Kutta method |
| (3) Formula method | (4) Hayakawa method |
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93. If the value of Z is around 115°C, then Q_{10} will be :

(1) 1.22

(2) 2.11

(3) 1.586

(4) 5.18

94. Thermal death time model equations for microbial inactivation at different temperatures can be expressed as:

 $(1) \log \frac{F}{F_0} = \frac{T - T_0}{Z}$

(2) $\log \frac{D}{D_0} = \frac{T - T_0}{Z}$

(3) $\log \frac{t_0}{t_T} = -\frac{T - T_0}{Z}$

(4) All of these

95. Kg of steam/kg of water vapour removed in an evaporator is called:

(1) Efficiency

(2) Effectiveness

(3) Steam use ratio

(4) Specific steam consumption

96. Radiation heat transfer is characterized by:

- (1) Energy transport as a result of bulk fluid motion
- (2) Thermal energy transfer as vibrational energy in the lattice structure of the material
- (3) Movement of discrete packets of energy as electromagnetic wanes
- (4) Circulation of fluid motion depends on buoyancy effects

97. The time temperature combination for HTST pasteurization of 71.1°C for 15 sec is selected on the basis of:

(1) Coxiella burnetii

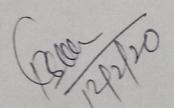
(2) E. coli

(3) B. subtilis

(4) C. botulinum

- 98. Stationary phase is described as:
 - (1) no further increase in the cell population after a maximum value
 - (2) deceleration of growth and division rate after the growth rate reaches a maximum
 - (3) acceleration of growth and division rate after the growth rate reaches a maximum
 - (4) deceleration of growth and division rate after the growth rate reaches a minimum
- 99. The function of the disengagement zone in an airlift fermenter is to:
 - (1) prevent CO2 rich bubbles from entering the downcomer
 - (2) reduce the velocity of the bubbles
 - (3) reduce liquid loss as aerosols
 - (4) all of the above
- 100. The monod model predicts that the specific growth rate:
 - (1) will decrease with the conc. of the growth limiting substrate
 - (2) will increase with the conc. of the growth limiting substrate until it reaches a maximum value
 - (3) will increase with the conc. of the growth limiting substrate
 - (4) does not depend on growth limiting substrate

| | ey of Entrand | 2021-22 | | |
|--------|---------------|---------|---|---|
| Q. No. | A | В | C | D |
| 1 | 3 | 1 | 2 | 2 |
| 2 | 2 | 2 | 4 | 4 |
| 3 | 3 | 1 | 3 | 4 |
| 4 | 1 | 4 | 1 | 1 |
| 5 | 2 | 4 | 4 | 2 |
| 6 | 2 | 3 | 2 | 3 |
| 7 | 1 | 1 | 2 | 2 |
| 8 | 4 | 1 | 2 | 2 |
| 9 | 2 | 4 | 4 | 4 |
| 10 | 3 | 2 | 2 | 1 |
| 11 | 2 | 2 | 2 | 3 |
| 12 | 4 | 3 | 4 | 4 |
| 13 | 3 | 1 | 3 | 4 |
| 14 | 1 | 2 | 4 | 3 |
| 15 | 4 | 3 | 2 | 4 |
| 16 | 2 | 1 | 3 | 1 |
| 17 | 2 | | | 1 |
| | | 4 | 2 | |
| 18 | 2 | 2 | 4 | 1 |
| 19 | 4 | 2 | 2 | 4 |
| 20 | 2 | 2 | 2 | 4 |
| 21 | 2 | 3 | 2 | 1 |
| 22 | 3 | 2 | 4 | 2 |
| 23 | 1 | 3 | 4 | 2 |
| 24 | 2 | 1 | 1 | 1 |
| 25 | 3 | 2 | 2 | 2 |
| | - | | | |
| 26 | 1 | 2 | 3 | 1 |
| 27 | 4 | 1 | 2 | 1 |
| 28 | 2 | 4 | 2 | 1 |
| 29 | 2 | 2 | 4 | 1 |
| 30 | 2 | 3 | 1 | 1 |
| 31 | 1 | 2 | 3 | 2 |
| | | | | |
| 32 | 2 | 4 | 4 | 4 |
| 33 | 2 | 3 | 4 | 3 |
| 34 | 1 | 4 | 3 | 1 |
| 35 | 2 | 2 | 4 | 4 |
| | | | 1 | 2 |
| 36 | 1 | 3 | | |
| 7 | 1 | 2 | 1 | 2 |
| 8 | 1 | 4 | 1 | 2 |
| 9 | 1 | 2 | 4 | 4 |
| | | | 4 | 2 |
| 0 | 1 | 2 | | |
| 1 | 1 | 4 | 1 | 2 |
| 2 | 2 | 2 | 2 | 4 |
| | | | 2 | 3 |
| 3 | 1 | 4 | | |
| 4 | 4 | 3 | 1 | 4 |
| 5 | 4 | 1 | 2 | 2 |
| | | | 1 | 3 |
| 5 | 3 | 1 | | |
| 7 | 1 | 1 | 1 | 2 |
| | 1 | 4 | 1 | 4 |
| 3 | | | | 2 |
|) | 4 | 1 | 1 | |
| | 2 | 3 | 1 | 2 |



| 51 | 3 | 1 | 2 | 4 |
|----------|---|-----|-----|-----|
| 52 | 4 | 2 | 3 | 2 |
| 53 | 4 | 2 | 1 | 4 |
| 54 | 3 | 1 | 2 | 3 |
| 55 | 4 | 2 | 3 | 1 |
| 56 | 1 | 1 | 1 | 1 |
| 57 | 1 | 1 | 4 | 1 4 |
| 58 59 | 1 | 1 | 2 2 | 1 |
| 60 | 4 | 1 1 | 2 | 3 |
| 61 | 4 | 2 | 1 | 4 |
| 62 | 2 | 4 | 2 | 3 |
| 63 | 4 | 4 | 1 | 2 |
| 64 | 3 | 1 | 4 | 4 |
| 65 | 1 | 2 | 4 | 2 |
| 66 | 1 | 3 | 3 | 1 |
| 67 | 1 | 2 | 1 | 3 |
| 68 | 4 | 2 | 1 | 4 |
| 69 | 1 | 4 | 4 | 1 |
| 70 | 3 | 1 | 2 | 2 |
| 71 | 2 | 4 | 4 | 3 |
| 72 | 4 | 3 | 2 | 2 |
| 73 | 4 | 2 | 4 | 3 |
| 74 | 1 | 4 | 3 | 1 |
| 75 | 2 | 2 | 1 | 2 |
| 76 | 3 | 1 | 1 | 2 |
| 77 | 2 | 3 | 1 | 1 |
| 78 | 2 | 4 | 4 | 4 |
| 79 | 4 | 1 | 1 | 2 |
| 80 | 1 | 2 | 3 | 3 |
| 81 | 4 | 2 | 3 | 2 |
| 82 | 3 | 4 | 2 | 3 |
| 83 | 2 | 3 | 3 | 1 |
| 84 | 4 | 1 | 1 | 2 |
| 85 | 2 | 4 | 2 | 3 |
| 86 | 1 | 2 | 2 | 1 |
| 87 | 3 | | 1 | |
| | | 2 | | 4 |
| 88 | 4 | | 4 | 2 |
| 89 | 1 | 4 | 2 | 2 |
| 90 | 2 | 2 | 3 | 2 |
| 91 | 2 | 3 | 4 | 1 |
| 92 | 4 | 4 | 3 | 2 |
| 93 | 3 | 4 | 2 | 1 |
| 94 | 4 | 3 | 4 | 4 |
| | | | | |
| 95 | 2 | 4 | 2 | 4 |
| 96 | 3 | 1 | 1 | 3 |
| 97 | 2 | 1 | 3 | 1 |
| 98 | 4 | 1 | 4 | 1 |
| 99 | 2 | 4 | 1 | 4 |
| 100 | 2 | 4 | 2 | 2 |
| 100 | 2 | 4 | | |
| | | | | |

