

**Engineering of Technological Processes (IPT, IPB, IOZE) – II (M.Sc. Programme)**

1. What is not a function of a filler?
2. What are the main stages of free-radical polymerization?
3. The „Oxo” process concerns the preparation of: ...
4. Sulfochlorination and sulfoxidation are the methods of preparation of: ...
5. Single superphosphate is produced by acidulation of ....
6. Fertilizer-grade monoammonium phosphates are produced from ...
7. Among biodegradable polymers are: ...
8. Polymer gels: ...
9. Carbon fibres are produced from: ...
10. Modified soybean oil is used to produce: ...
11. Drying in fluidized systems provides: ...
12. Microwave drying is: ...
13. What is the character of distance (R) dependence of energy for dispersive interactions?
14. How is electron tunnelling current related to the tip-sample distance in STM or the length of molecular spacer between donor and acceptor?
15. Water is a strongly polar solvent. In which direction does it change under supercritical conditions and how does it affect the solubility properties of water?
16. One of the special properties of ionic liquids was found very advantageous in industrial applications. Which one?
17. In the film model, which is based on the concept of laminar layer at the interface, the mass transfer is effected by:
18. Mass transfer modelled by penetration theory is described by equation of: ...
19. Models describing the transport of energy, mass and momentum are usually described using: ...
20. Multicomponent two phase (gas-liquid) mixture, composed of n components at temperature T and pressure P, is in the state of physicochemical equilibrium when the following conditions are met: ...
21. Packages such as Aspen, ChemCAD or Pro II are called ...
22. Which example of rounding a number while conducting calculations ‘manually’ is incorrect ...
23. How to define the new variables X and Y to transform the equation  $y = a \cdot x^b$  to the linear form  $Y = A + B \cdot X$ ?
24. Choose the sentence about linear equations that is incorrect: ...
25. Why is it not recommended to use interpolation with high degree polynomials?
26. Which statement that refers to splines is incorrect?
27. Which statement that refers to genetic algorithms is incorrect?
28. What is the correct order of genetic operations in a typical genetic algorithm?
29. Which of the following sentences defines the effectiveness factor?
30. Mathematical model of an exothermic reaction occurring in a catalytic pellet consists of ... (how many equations) ?
31. Negligible external mass transfer resistances correspond to ...
32. Which of the following equations defines Thiele modulus?
33. What values can the effectiveness factor have for isothermal reaction?
34. Which of the following assumptions is accepted when a pseudo-homogeneous model of a gas-solid catalytic reactor is used?
35. Which of the following assumptions have to be fulfilled in order to use one-dimensional model of a gas-solid catalytic reactor for an exothermic reaction?
36. Which of the following sentences defines the autothermal process?
37. A characteristic feature of free barbotage is: ...
38. A porosity of packing is defined as a ratio of the: ...
39. Packing columns most often operate: ...
40. An increase of gas flowrate in gas-solid fluidized bed results in: ...
41. According to the information given during the lectures there is a following number of methods of mining of minerals or deposits from the sea bottom with the application of hydrotransport: ...

42. The fluidization number is defined as a ratio of ...
43. In a horizontal two-phase gas-liquid ring flow: ...
44. A possibility of reduction of liquid flow resistance in the pipeline is possible only in the case of: ...
45. How many membrane structures exists: ...
46. Basal parameter of ultrasound wave used to hydrodynamic calculations are:...
47. Which of the following are not the separation processes ?
48. To establish basic dimensions of ultrasonic extractor, the necessary parameters are ... ?
49. Physical and chemical adsorption (compare).
50. The BET isotherm ...
51. Industrial adsorption processes generally consist in adsorption and desorption steps. The change of what parameters is used in these methods ?
52. What is the operating principle of an adsorption chiller based on? What is the role of adsorption?
53. Which of the following formulas presents Monod equation?
54. Which of the following formulas presents Haldane equation??
55. Which of the following systems of equations present a mathematical model a continuous stirred tank bioreactor for single-substrate microbiological process at steady state?
56. Which of the sentences defines the growth yield coefficient?
57. Which of the properties below is a consequence of predator presence in a microbiological reactor?
58. Critical residence time is defined as...
59. Which of the properties is a consequence of biofilm presence in a microbiological reactor?
60. Chose the sentence which describes the effects of increasing the value of the biomass thickening degree on stationary characteristics of a bioreactor with recirculation.
61. The mixing homogeneity is given by: ...
62. For the estimation of mixing power, the following non-dimensional module is used: ...
63. Power number for mixing depends on the Rem number in the following flow region ...
64. The Rem number (the most frequent case) for the newtonian and non-newtonian systems differs by: ...
65. The basic parameters for balancing of mixing process: ...
66. Coefficient of mass transfer In mixing processes is incorporated in: ...
67. Macromixing is characterised by time of ...
68. Power number  $Po$  is a function of ...
69. Necessary parameters for the modelling of disperse systems are: ...
70. The most frequent model of disperse systems: ...
71. Disperse phase droplet coalescence influences: ...
72. Mixing time influences: ...
73. The basic hydrodynamical parameters, used to model disperse systems are: ...
74. In which regions the viscous forces have significant influence on the size of stable droplets:
75. Which dimensionless number decides about disperse chase droplet disruption: ...
76. Mass transfer coefficient is included in the dimensionless module ...
77. Addition of surfactant lowers ...
78. For the evaluation of the specific area in the liquid-liquid systems (spherical droplets), the following formula can be used: ...
79. The most frequently used diameter in the modelling of liquid-liquid systems is: ...
80. Sherwood number is a function of the following dimensionless numbers: ...
81. In case of parallel connection of two identical rotary pumps in a plant: ...
82. In case of serial connection of two identical rotary pumps: ...
83. The theoretical characteristic of positive-displacement pumps (pressure – y coordinate, vs. throughput – x coordinate) is:
84. The peristaltic pump is a pump with ...
85. If two parallel branches coming from one pipeline have different resistance coefficients then during the fluid flow:
86. The fan power is directly proportional to the: ...
87. When throttling a fan in a delivery pipeline: ...

88. A rotational speed of piston pump should be: ...
89. The Ljungstroem regenerator is: ...
90. The relation  $\epsilon = NTU / (1 + NTU)$  describes a thermal effectivity of heat exchanger with:  
( $\epsilon$  – thermal effectivity, NTU – number of heat transfer units) ...
91. A dimensionless criterion including the pressure drop to overcome the hydraulic resistances (e.g. in a heat exchanger) is: ...
92. A thickness of metal sheets most often used for punching the plates of heat exchangers is:
93. The first firm manufacturing the plate heat exchangers was: ...
94. The specific surface of miniature heat exchangers manufactured by Heatric LTD has a range of:...
95. The most often ways of formation of microchannels and connection of plates in miniature heat exchangers are: ...
96. What type of heat exchanger is presented in the figure?
97. The packing element presented in the figure is ...
98. The process of formation of crystals is: ...
99. The work of formation of nucleus of crystallization depends on: ...
100. In the crystallizer designed for initiation of crystallization, presented in the figure, the solution for cooling and supersaturation flows ...
101. The basic parameters in modelling of turbulent flows according to Kolmogorov theory are: ...
102. The Batchelor length scale is given by ...
103. Da number is: ...
104. Segregation intensity  $I_s=0$  means ...
105. Energy - not converted part of energy: ...
106. Thermal performance (efficiency) of the heat pump: ...
107. The unit of exergy is: ...
108. Free energy is a function of thermodynamic state defined by the expression: ...
109. The temperature of the ground water in Poland in depths greater than 6 m is equal: ...
110. Operation of the classic heat pump is based on: ...
111. Linear neurons may be treated as basic processors having the following properties: ...
112. Neural networks ...
113. Advantages of neural networks are as follows ability to: ...
114. Increase in computing power of neural networks may be obtained by ...
115. The Arrhenius equation is described by: ...
116. The dimension of the kinetic rate constant for 2<sup>nd</sup> order reaction is:...
117. The catalysts characterisation may include the following spectroscopic methods:
118. The commercially used catalyst for methane catalytic combustion is: ...
119. Preliminary studies in the project design include: ...
120. The general plant layout should include: ...
121. The methods of estimation of operating costs are based on: ...
122. Safety aspects and environmental control in plant design cover: ...
123. Important practices of noise abatement in plant design include: ...
124. Investment costs for noise control normally amount ..... % of total plant material and installation costs: ...
125. Data sheet for process equipment includes: ...
126. The selection of constructional material is dictated by the following criteria: ...
127. The following results from feasibility study provide the basics for deciding to proceed the preliminary design phase:
128. Risk analysis in plant design include: ...