

PART III

20 — PRODUCTION AND INDUSTRIAL ENGINEERING

(Answer ALL questions)

41. A Linear Programming problem with a bounded feasible solution space will always have
- Some basic feasible solutions but no optimal solution
 - Some basic feasible solutions and at least one optimal solution
 - No basic feasible solutions and no optimal solution
 - No basic feasible solutions but at least one optimal solution
42. Which one of the following is not a basic assumption of linear programming?
- Linearity
 - Additivity
 - Divisibility
 - Feasibility
43. The dual problem statement is formulated with the help of the information available statement is called
- Primal problem
 - Prime Problem
 - Optimal problem
 - Primal constants
44. Postman needs to visit all 5 geographically distributed post offices beginning and ending at the same post office and without visiting any other post office twice. We need to find the optimum path for the postman so that he covers the minimum possible distance. This is an example of
- Travelling Salesman problem
 - Chinese Postman problem
 - Travelling Postman problem
 - Chinese Salesman problem
45. When the total allocations of a transportation problem are less than the sum of the number of supply point and demand point values, the solution is called _____ solution.
- Non-degenerate
 - Degenerate
 - Feasible
 - Infeasible
46. Which of the following algorithms considers all pairs of shortest paths?
- A* search algorithm
 - Dijkstra's algorithm
 - Bellman-Ford algorithm
 - Floyd-Warshall algorithm
47. Which of the following is not an inventory?
- Machines
 - Raw materials
 - Finished products
 - Consumables
48. Productivity is
- Output/Input
 - Input/Output
 - $(\text{Input} + \text{Output})/\text{Input}$
 - $(\text{Input} + \text{Output})/\text{Output}$
49. Which of the following is the correct sequence of steps used in the method study?
- SELECT-RECORD-EXAMINE-DEVELOP- INSTALL- MAINTAIN
 - SELECT-RECORD-EXAMINE-INSTALL- MAINTAIN-DEVELOP
 - SELECT-RECORD-INSTALL-EXAMINE- MAINTAIN-DEVELOP
 - SELECT-EXAMINE-RECORD-DEVELOP- INSTALL- MAINTAIN

50. The most frequently used components are arranged in
- Left side
 - Right side
 - Central location
 - Any of the above
51. The Design capacity is
- Rate of goods output under full operating conditions
 - Rate of goods output under actual operating conditions
 - Rate of goods output under reduced operating conditions
 - Rate of goods output under half operating conditions
52. The amount of time by which the completion time of job j differs from the due date is called
- Flow Time
 - Processing Time
 - Lead Time
 - Lateness
53. The value of the smoothing constant used in exponential smoothing will be
- Between -1 and 1
 - Between 0 and 1
 - Between -1 and 0
 - Between 0 and infinity
54. A product passes through four machines A, B, C and D with cycle times 4 min, 4 min, 3 min and 2 min respectively. Then which are the bottleneck machines?
- Machine A and C
 - Machine B and C
 - Machine A and B
 - Machine C and D
55. Match the following group 1 (charts) with group 2 (use) and select the correct option.
- | | | |
|-------------|-----|---------------------------------------|
| (1) R chart | (A) | study the number of defects per unit |
| (2) C chart | (B) | size of a variable is studied |
| (3) P chart | (C) | dispersion of measured data |
| (4) X chart | (D) | defective units produced per subgroup |
- 1 - A, 2 - B, 3 - D, 4 - C
 - 1 - C, 2 - D, 3 - B, 4 - A
 - 1 - A, 2 - D, 3 - B, 4 - C
 - 1 - C, 2 - A, 3 - D, 4 - B
56. When using the SPC methodology, a system is said to be stable when
- the system is efficient
 - the mean and range of variation caused by the system are controllable
 - the mean and range of variation caused by the system are predictable
 - the performance of the system is improving
57. C-chart follows ———— distribution.
- Normal
 - Poisson
 - Binomial
 - Weibull
58. An estimate of the measurement error is obtained through an index is known as
- Precision-to-tolerance Ratio
 - Tolerance-to-precision Ratio
 - Capability Ratio
 - Taguchi Capability Ratio
59. Total productive maintenance strives to produce overall equipment effectiveness, through a combination of availability, performance efficiency and
- Rate of quantity of products
 - Rate of quality products
 - Rate of Quantity process
 - Rate of Performance products

60. The term availability is used to indicate the probability of a system or equipment being in operating condition at any time t , given that it was in operating condition at
- 1
 - 0
 - α
 - constant
61. Blanking and piercing operations can be performed simultaneously in one stroke of the ram is
- Progressive die
 - Simple die
 - Combination die
 - Compound die
62. In metal cutting operations, continuous chips are produced while machining
- Brittle material
 - Ductile material
 - Hard material
 - All of the above
63. Tool life is mostly affected by
- Tool geometry
 - Cutting speed
 - Feed and depth
 - Microstructure of material
64. Steel wire is manufactured by _____ process.
- Deep drawing
 - Forging
 - Drawing
 - Extrusion
65. Lewis equation in spur gear is applied
- Only to the pinion
 - Only to the gear
 - To weaker of pinion or gear
 - To stronger of pinion or gear
66. The friction torque for square thread at mean radius while raising load is given by (ω = load, R_o = mean radius, ϕ = angle of friction, α = lead angle)
- $\omega R_o \tan (\phi - \alpha)$
 - $\omega R_o \tan (\phi + \alpha)$
 - $\omega R_o \tan \alpha$
 - $\omega R_o \tan \phi$
67. The size of a cam depends upon
- Base circle
 - Pitch circle
 - Pitch curve
 - Prime circle
68. The equation $3 \frac{d^2 x}{dt^2} + 6 \frac{dx}{dt} + 15x = 20 \cos 4t$ shows a vibrations system. The maximum amplitude of the system will be
- 50 cm
 - 51 cm
 - 49 cm
 - 52 cm
69. In Opitz system, 2nd digit indicates
- Type and shape
 - External shape and external shape elements
 - External plane surface finishing
 - Auxiliary hole and gear teeth

70. Which of the following is not a layout configuration used in FMS?
- In-line
 - Loop
 - Ladder
 - Circle
71. The pattern used for mass production is
- Match plate pattern
 - Skeleton pattern
 - Split pattern
 - Single plate pattern
72. In slush casting, ————— is used.
- Metallic core
 - Sand core
 - Wooden core
 - No core
73. Thermit welding is a form of
- Resistance welding
 - Gas welding
 - Fusion welding
 - Forge welding
74. Seam-welding is
- Multi-spot welding process
 - Continuous spot welding process
 - Used to form mesh
 - Used for welding cylindrical objects
75. Last constituent to fail in fiber reinforced composites is
- Matrix
 - Fiber
 - Both fails at same time
 - Can't define
76. Longitudinal strength of fiber reinforced composite is mainly influenced by
- Fiber strength
 - Fiber orientation
 - Fiber volume fraction
 - Fiber length
77. The solidification of an alloy from one phase to another phase without changes in chemical composition is called
- Eutectic reaction
 - Allotropy
 - Congruent transformation
 - Homogenization
78. A heat treatment process which will improve the machinability of hypereutectoid steel is
- Austempering
 - Spheroidizing
 - Bainitic transformation
 - Process annealing
79. Which of the following elements strongly promote graphitization in Cast Iron?
- Sulphur
 - Manganese
 - Silicon
 - Vanadium
80. Monel metal is an alloy of
- Nickel- Copper
 - Chromium- Aluminum
 - Silicon - Beryllium
 - Tin - Lead
81. The energy per unit volume that can be absorbed by a material up to the point of fracture is known as
- Resilience
 - Endurance limit
 - Toughness
 - Modulus of rigidity

82. The cost towards machining of special jigs or fixtures, pattern, tooling made for the job is
- Direct expense
 - Administrative expense
 - Indirect material cost
 - Overhead cost
83. Tong hold loss is a
- Welding loss
 - Forging loss
 - Machining loss
 - Casting loss
84. The time wasted by the operator due to breakdown, non-availability or supply of tool and material is
- Down time
 - Setup time
 - Unit operation time
 - Allowance
85. An instrument which is designed to eliminate the personal element of feel when setting a measuring equipment for measurement is known as:
- Fiducial indicator
 - Standard
 - Scale
 - Device
86. Which type of tolerance does a slip gauge have?
- Unilateral tolerance
 - Bilateral tolerance
 - Universal tolerance
 - Zero tolerance
87. In surface photography of measuring surface finish of machined surfaces using vertical illumination, which portion appears as bright area?
- Hills
 - Scratch
 - Valleys
 - Flat portion
88. Which of the following is a reason for pitch errors observed in threads?
- Lack of inspection
 - Incorrect ratio of tool work velocity
 - Interference between mating parts
 - Less skilled operator
89. Which of the following is used for rolling tests?
- Tooth caliper
 - Parkinson gear tester
 - Base pitch measuring instrument
 - Involute profile testing machine
90. Which of the following is an application of machine vision system?
- Assembly verification
 - Image processing
 - Reliability testing
 - Cause and effect analysis
91. Which of the following the techniques that is not suitable to measure large diameter parts or large gaps?
- Diffraction pattern technique
 - Scanning laser technique
 - Photodiode array imaging
 - Laser triangulation sensor

92. In Ultrasonic Machining, the material is removed by
- Anodic dissolution
 - Thermal melting
 - Abrasive action
 - Electrochemical oxidation
93. Which of the following statements are true for Electro-Chemical Machining (ECM)?
- ECM is capable of machining metals and alloys irrespective of their strength and hardness
 - No cutting forces are involved in ECM process
 - Erosion of metal takes place as a reverse process of electroplating
 - Dielectric is used in Electro-Chemical Machining
- (1), (2) and (3)
 - (2), (3) and (4)
 - (1), (3) and (4)
 - (1), (2) and (4)
94. What is the value of gap maintained in between the electrodes while machining with Electro Discharge Machining?
- 10 – 100 μm
 - 100 – 200 μm
 - 200 – 500 μm
 - 500 – 1000 μm
95. The range of diameters obtained using Laser drilling process is
- 0.0001 – 0.001 mm
 - 0.001 – 0.01 mm
 - 0.005 – 1.25 mm
 - 1.5 – 10.5 mm
96. Which of the following codes is used to rotate the spindle of the CNC machine tool in clockwise direction?
- M04
 - G03
 - G04
 - M03
97. How many number of degrees of freedom is exhibited by the robot wrist?
- 1
 - 3
 - 2
 - 4
98. The positioning accuracy of robotic arm is the highest in the following type configuration of a robot
- Cartesian Robot
 - Cylindrical Robot
 - Articulated jointed arm robot
 - Spherical co-ordinate robot
99. Which one of the following rapid prototyping processes uses a photosensitive liquid polymer as the starting material?
- Fused deposition modeling
 - Laminated-object manufacturing
 - Selective laser melting
 - Stereolithography
100. Direct Energy Deposition is
- A process in which a droplet of build material are selectively deposited
 - A process in which a thermal energy selectively fuses regions of a powder bed
 - A process in which focused thermal energy is used to fuse materials by melting as the material is being deposited
 - A process in which a material is selectively dispensed through an orifice