

147. The type of production system suitable for zero inventories is named as
(a) CIM (b) FMS
(c) CANBAN (d) JIT
148. Reorder point under inventory management means the sum of
(a) buffer, reserve and safety stock (b) buffer and safety stock
(c) reserve and safety stock (d) buffer and reserve stock
149. Normal distribution of the project completion time is assumed to follow in
(a) CPM (b) PERT
(c) both CPM and PERT (d) none of these
150. Centre of gravity method is used in decision analysis of
(a) plant layout (b) plant location
(c) plant floor (d) plant area

* * * * *

MIZORAM PUBLIC SERVICE COMMISSION
TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF
GRADE-V OF MIZORAM ENGINEERING SERVICE (AE/SDO)
UNDER POWER & ELECTRICITY DEPARTMENT, GOVERNMENT OF MIZORAM
JANUARY, 2012

MECHANICAL ENGINEERING
PAPER – III

Time Allowed : 3 hours

Full Marks : 150

All questions carry equal marks of 1 each.
Attempt all questions.

1. The hardness is the property of the material due to which it can
(a) be drawn into wires (b) be rolled into thin sheets
(c) resist fracture due to impact load (d) cut another material
2. Strength is the ability of the material to resist
(a) deformation under stress (b) externally applied forces with breakdown
(c) fracture due to high impact load (d) none of the above
3. When heat is applied to a material, the toughness of the material
(a) remains same (b) decreases
(c) increases (d) none of the above
4. The packing of atoms in hexagonal closed packed lattice is
(a) maximum (b) minimum
(c) moderate (d) none of the above
5. The property of the material which enables it to retain the deformation permanently is called
(a) brittleness (b) ductility
(c) malleability (d) plasticity
6. The material that has maximum malleability in the following list is
(a) copper (b) aluminium
(c) lead (d) steel
7. Hematite iron ore contains about _____ of iron
(a) 70% (b) 55%
(c) 45% (d) 35%

8. The process of reducing the ore with carbon in the presence of a flux is called
(a) annealing (b) smelting
(c) carbonation (d) hardening
9. A high carbon steel contains
(a) 0.8 – 1.5% of carbon (b) 0.2 – 0.7% of carbon
(c) 1.6 – 2.0% of carbon (d) None of the above
10. Silicon is added to low carbon steel to make the steel
(a) tougher (b) harder
(c) tougher and harder (d) tougher and softer
11. Invar is a steel alloy that contains nickel approximately as
(a) 20% (b) 36%
(c) 48% (d) none of the above
12. Invar is a steel alloy that has
(a) high coefficient of expansion (b) low coefficient of expansion
(c) medium coefficient of expansion (d) zero coefficient of expansion
13. When chromium is added to steel, its tensile strength
(a) decreases (b) increases
(c) remains unaffected (d) none of the above
14. Temperature at which solid glass changes to liquid glass is
(a) softening temperature (b) transition temperature
(c) critical temperature (d) none of the above
15. In a unit cell of a body centred cubic space lattice, the number of atoms is
(a) nine (b) six
(c) fourteen (d) seventeen
16. The type of space lattice found in gamma-iron is
(a) close packed hexagonal space lattice (b) body centred cubic space lattice
(c) face centred cubic space lattice (d) none of the above
17. The type of failure of a material that can be avoided by adopting nitriding is
(a) creep failure (b) buckling failure
(c) fatigue failure (d) none of the above

137. The type of organization which is not suitable for complex and large organization is
(a) functional organization (b) line organization
(c) line and staff organization (d) none of these
138. Span of control basically signifies the capacity of the manager in line of
(a) supervision (b) motivation
(c) control (d) all of these
139. In ABC analysis under inventory control, the group 'B' consists of items which constitutes X% of total stored items, then X is equal to
(a) 10 (b) 20
(c) 70 (d) 30
140. The method of determining the worker's performance on a job is
(a) relative values of a job (b) merit rating
(c) machine worth method (d) overall production value
141. The process layout is considered best if it minimizes the total cost of
(a) machines used (b) material handling equipments
(c) material handling operation (d) land and building
142. The chart which gives an estimate about the amount of material handling between various work stations is known as
(a) flow chart (b) process chart
(c) travel chart (d) bar chart
143. An activity in network analysis is represented by
(a) circle (b) square
(c) straight line (d) curved line
144. All events on critical path have
(a) float > 1 (b) float < 1
(c) float=0 (d) none of these
145. PERT analysis is based on
(a) three times (b) single time
(c) two times (d) none of these
146. The type of organization suitable for paper industry is
(a) functional organization (b) line organization
(c) line and staff organization (d) none of these

127. The difference between maximum and minimum quantity is known as
(a) economic inventory (b) standard inventory
(c) reorder inventory (d) none of these
128. The difference between the reorder level and the average lead time demand is called as
(a) safety stocks (b) under stocks
(c) over stocks (d) economic stocks
129. The use of material requirement planning (MRP) based system to plan all the resources of a manufacturing company is called
(a) MRP- I (b) MRP- II
(c) MRP-III (d) none of these
130. The ratio between measure of output and measure of input may be termed as
(a) profitability (b) usability
(c) price index (d) productivity
131. The reason for low productivity of an organization is
(a) poor product design (b) lack of standardization
(c) improper cutting tools (d) all of these
132. Which one of the following is not an example of joint sector?
(a) private entrepreneurs (b) joint stock companies
(c) private limited company (d) public limited company
133. Due to standardization, the total cost of the product is
(a) reduced (b) increased
(c) unaffected (d) none of these
134. Due to simplification, the inventory stock becomes
(a) more (b) less
(c) same (d) none of these
135. Which one of the following functions does not fall under production control procedure?
(a) inspecting (b) routing
(c) scheduling (d) dispatching
136. The chart which is helpful in scheduling, dispatching and control is
(a) bar chart (b) Gantt chart
(c) activity chart (d) process chart

18. When low carbon steel is heated up to upper critical temperature
(a) the grain size does not change (b) the grain size increases rapidly
(c) the grain size increases slowly (d) none of the above
19. Micro-structure of a material is generally examined by
(a) optical microscope (b) X-ray technique
(c) spectroscopy (d) none of the above
20. An allotropic material should have
(a) fixed structure at all temperature (b) different structures at different temperature
(c) atoms distributed in random patterns (d) none of the above
21. Steel which is more ductile and has a less tendency to distort during heat treatment is
(a) fine grained steel (b) super fine grained steel
(c) coarse grained steel (d) uniform grained steel
22. The iron that exists between 910°C and 1405°C is termed as
(a) α -iron (b) β -iron
(c) γ -iron (d) δ -iron
23. The process of lowering the hardness and tensile strength but improving the machinability of steels is
(a) normalizing (b) quenching
(c) annealing (d) spheroidising
24. The process used for relieving the internal stresses previously set up in the metal and for increasing the machinability of steel is
(a) normalizing (b) full annealing
(c) process annealing (d) spheroidising
25. The aluminium alloy that is mainly used for anodized utensil manufacture is named as
(a) duralumin (b) Y-alloy
(c) magnalium (d) hindalium
26. An alloy of copper and zinc is called
(a) bronze (b) brass
(c) duralumin (d) blue copper
27. Ceramic material is used to pack the absorber because of its
(a) high corrosion resistance (b) ability to form plastic mass with water
(c) high coefficient of expansion (d) none of these

28. An alloy of nickel and copper is called
(a) monel metal (b) gun metal
(c) Babbitt metal (d) none of the above
29. White metal is suitable for bearings subjected to
(a) light load (b) heavy load
(c) medium load (d) no load
30. Manganese bronze has
(a) high elasticity and wearing qualities (b) high yield point
(c) high resistance to corrosion (d) good cold working property
31. In full annealing, the hypereutectoid steel is heated from 30°C to 50°C above the upper critical temperature and then cooled in the furnace
(a) slowly (b) rapidly
(c) first slowly then suddenly (d) none of the above
32. The process in which hypo-eutectoid steel is heated from 30°C to 50°C above the upper critical temperature and then cooled suddenly in a suitable cooling medium is called
(a) tempering (b) softening
(c) hardening (d) straining
33. Delta-iron occurs between the temperature ranges of
(a) 400°C to 600°C (b) 600°C to 900°C
(c) 900°C to 1400°C (d) 1400°C to 1600°C
34. The lower critical temperature is same for
(a) high carbon steel (b) medium carbon steel
(c) low carbon steel (d) all the above
35. The bond formed by sharing of atoms is called
(a) covalent bond (b) ionic bond
(c) metallic bond (d) coordinate bond
36. Atomic packing factor for a body centred cube (BCC) is
(a) 0.68 (b) 0.52
(c) 0.74 (d) none of these
37. The coordination number of face centred cube (FCC) is
(a) 6 (b) 8
(c) 12 (d) 16

117. Which one of the following is not related to stop watch time study equipment?
(a) non-fly back (b) fly back
(c) split hand (d) fly forward
118. Detailed work factor analysis under work study finds its wide application in
(a) electronic industry (b) steel industry
(c) IT industry (d) automobile industry
119. Network analysis were developed from the concept of
(a) milestone chart (b) bar chart
(c) both milestone and bar chart (d) flow process chart
120. PERT is a network analysis mainly based on
(a) event oriented (b) activity oriented
(c) process oriented (d) none of these
121. Critical path in network analysis is one which consumes
(a) minimum time (b) zero time
(c) maximum time (d) optimal time
122. Value of a product can be increased by
(a) increasing its utility (b) increasing its cost
(c) decreasing its cost (d) both (a) and (c)
123. The founder of scientific management is
(a) F.W.Taylor (b) H.Fayol
(c) H.L.Gantt (d) Gilbreth
124. The father of principles of management is
(a) F.W.Taylor (b) H.Fayol
(c) H.L.Gantt (d) Gilbreth
125. Which one of the following is not a direct function of directing?
(a) communication (b) motivation
(c) supervision (d) control
126. Lubricants and spare parts needed for proper operation and repair are classified under
(a) in-process inventory (b) raw inventories
(c) indirect inventories (d) none of these

- 107.** The basic drive systems usually used in commercially available robots is
(a) hydraulic (b) electric motor
(c) pneumatic (d) all the above
- 108.** The most advanced commercial language designed for use with robots is
(a) VAL (b) REL
(c) ROBOTICA (d) ROB
- 109.** Which one of the following is plant layout tool and technique?
(a) flow diagram (b) REL chart
(c) flow process chart (d) all of these
- 110.** In order to obtain maximum flexibility, the layout recommended is
(a) product layout (b) process layout
(c) combined layout (d) matrix layout
- 111.** In order to achieve part interchangeability, the type of layout suggested is
(a) product layout (b) process layout
(c) combined layout (d) matrix layout
- 112.** The problem of line balancing is particularly important in
(a) product layout (b) process layout
(c) combined layout (d) matrix layout
- 113.** Margin of safety is generally expressed as
(a) ratio of budgeted sales to sales at BEP (b) ratio of actual sales to sales at BEP
(c) percentage of budget to BEP (d) all of these
- 114.** Which one of the following control charts does not fall under attribute category?
(a) X-chart (b) p-chart
(c) c-chart (d) np-chart
- 115.** In process chart, the symbol 'D' stands for the meaning of
(a) storage (b) inspection
(c) delay (d) transport
- 116.** Multiple activity chart is used to optimize
(a) idle time (b) work distribution
(c) labour cost (d) all of these

- 38.** The number of atoms per unit cell in body centred cube (BCC) is
(a) 1 (b) 2
(c) 3 (d) 4
- 39.** The materials with ionic bond have
(a) high melting point (b) moderate melting point
(c) low melting point (d) none of these
- 40.** Cubical crystal structure is found in
(a) metal (b) gas
(c) liquid (d) all of these
- 41.** Vacancy arises in a crystal due to
(a) missing atoms (b) presence of extra atoms
(c) presence of foreign particles (d) none of these
- 42.** At or above Curie temperature a ferromagnetic material behaves like a
(a) diamagnetic material (b) paramagnetic material
(c) ferri magnetic material (d) anti ferro magnetic materials
- 43.** An amorphous solid like glass can be characterized as
(a) a malleable solid (b) a crystal like structure
(c) a good conductor (d) a super cooled liquid
- 44.** The permeability of soft magnetic material is
(a) low (b) medium
(c) high (d) all of these
- 45.** Boro silicate glass has good resistance to
(a) heat (b) chemicals
(c) both heat and chemicals (d) none of these
- 46.** Short range crystalline lattice structure is generally observed in
(a) thermoplastics (b) composites
(c) refractories (d) thermosetting plastics
- 47.** The material which does not become hard with the application of heat and pressure and no chemical change occurs is categorized as
(a) thermoplastics (b) thermoelastics
(c) composites (d) thermosetting plastics

48. Ply wood is an example of
(a) layered composite (b) fibre reinforced composite
(c) ceramic bonded with metal (d) none of these
49. Composites are mainly used in
(a) automobile industry (b) marine engineering
(c) aeronautical engineering (d) all of these
50. Ceramics are processed at
(a) low temperature (b) medium temperature
(c) high temperature (d) any temperature
51. The most important property of metal which is extensively used for fabrication by mechanical working is
(a) elastic deformation (b) plastic deformation
(c) both elastic and plastic deformation (d) none of these
52. If a metal is mechanically processed below the crystallization temperature of the metal, it is called as
(a) cold work (b) hot work
(c) elastic work (d) plastic work
53. A forming operation which is carried on cylindrical rolls is termed as
(a) casting (b) drawing
(c) rolling (d) grinding
54. The number of high rolls which is most commonly used for both cold and hot rolling process to minimize production cost is
(a) three (b) four
(c) six (d) two
55. The process of increasing the length of a bar at the expense of its cross sectional area is called
(a) drawing down (b) setting down
(c) drawing up (d) setting up
56. The process by which heated metal is shaped by the action of sudden blows or steady pressure is called
(a) casting (b) forging
(c) hammering (d) pressing

97. Which of the following processes does not suit the generation of internal gears?
(a) hobbing (b) honing
(c) shaving (d) none of these
98. Ratio between the pitch diameter and the number of teeth is called as
(a) circular pitch (b) diametral pitch
(c) radii pitch (d) none of these
99. Which of the following angle does not comprise the signature of the cutting tool?
(a) back rake angle (b) side rake angle
(c) back relief angle (d) side relief angle
100. Machining performance can be improved by adopting
(a) CNC retrofitting (b) CNC by fitting
(c) CNC post fitting (d) CNC pre fitting
101. The manufacturing systems most suitable for batch type of production for minimizing lead time is
(a) CIM (b) FMS
(c) CAD (d) CAM
102. CAD/CAM is a unified software systems that mainly includes
(a) product specification (b) product design
(c) manufacturing details (d) all of these
103. Flexible manufacturing system (FMS) was first introduced around the year
(a) 1970 (b) 1980
(c) 1990 (d) 2000
104. The decision to use FMS should be based on
(a) product size (b) accuracy required
(c) product life cycle (d) all of these
105. The manipulator of a robot usually has degree of freedom as
(a) four (b) six
(c) eight (d) ten
106. The type of energy input in laser beam machining is
(a) chemical (b) electro-chemical
(c) electro-thermal (d) all of these

87. The plastic deformation that takes place in a narrow zone in the vicinity of the cutting edge is called
- (a) plastic zone (b) shining zone
(c) shear zone (d) yield zone
88. The value of shear angle depends on
- (a) work piece material (b) cutting conditions
(c) material of tool (d) all the above
89. The tool failure may occur due to
- (a) excessive temperature (b) excessive stress
(c) flank wear (d) all the above
90. The diamond can be run at cutting speeds of about _____ greater than that for high speed tools.
- (a) 50 times (b) 30 times
(c) 20 times (d) 10 times
91. The example of orthogonal cutting is
- (a) slotting cutters (b) milling cutters
(c) drills (d) planers
92. The operation of embossing a diamond shaped pattern on the surface of a work piece is called
- (a) knurling (b) reaming
(c) turning (d) tapping
93. Time required for machining by EDM in comparison to the conventional machining is
- (a) less (b) equal
(c) more (d) unpredictable
94. In electro discharge machining (EDM), metal removal takes place as
- (a) chemical reaction of metal (b) dissolution of metal
(c) erosion of metal (d) none of these
95. The last operation performed on the hardened gears for correcting gear errors is called
- (a) brushing (b) hobbing
(c) honing (d) none of these
96. The difference between actual tooth thickness and the width of space, with which it meshes, is known as
- (a) clearance (b) backlash
(c) module (d) pitch

57. The process of cutting or shearing a blank sheet or strip material is called as
- (a) piercing (b) shearing
(c) sheeting (d) blanking
58. The metal forming process that allows excellent surface finish and dimensional accuracy is
- (a) die casting (b) centrifugal casting
(c) forging (d) none of these
59. A model of casting which is constructed in such a way that it can be used for forming an impression in damp sand is defined as
- (a) molding (b) pattern
(c) damper (d) prototype
60. The cracks having ragged edges due to tensile stresses during solidification is termed as
- (a) cold tears (b) blue tears
(c) black tears (d) hot tears
61. Automobile bodies can be manufactured by employing
- (a) deep drawing (b) tube drawing
(c) wire drawing (d) rod drawing
62. The process of blending powders is carried out to obtain
- (a) uniformity (b) special properties
(c) longer die life (d) all of these
63. During the sintering process bonding of the individual powder particles takes place by
- (a) melting of a minor constituent (b) diffusion
(c) mechanical bonding (d) all of these
64. The heating of pressed compact to below the melting temperature of any constituent of the product, or at least below the melting temperature of all principal constituents of the product is called
- (a) tempering (b) compacting
(c) atomizing (d) sintering
65. Upon which of the following parameters does the current intensity in arc welding depend?
- (a) stability of arc (b) electrode diameter
(c) gap between electrode and metals (d) thickness of metals
66. Welding operation where two non-consumable electrodes are used is
- (a) MIG (b) TIG
(c) atomic hydrogen (d) submerged arc

67. For gray cast iron, which of the following welding methods is preferable?
(a) MIG (b) submerged arc
(c) gas flame (d) electric arc
68. The welding process in which heat is produced for welding by chemical reaction is called as
(a) resistance welding (b) thermit welding
(c) forge welding (d) gas welding
69. The material used for coating the electrode is called
(a) flux (b) slag
(c) protective layer (d) deoxidizer
70. The welding process in which two pieces to be joined are overlapped and placed between two pointed electrodes is called as
(a) seam welding (b) resistance welding
(c) projection welding (d) spot welding
71. Preheating is essential in welding of
(a) copper (b) aluminium
(c) cast iron (d) stainless steel
72. The temperature, in arc welding is of the order of
(a) 2000°C (b) 3000°C
(c) 5500°C (d) 7000°C
73. Due to which of the following reasons does distortion in welding occur?
(a) oxidation of weld pool (b) use of high voltage
(c) improper clamping devise (d) use of high current
74. In which of the following processes does electrode gets consumed?
(a) TIG welding (b) resistance welding
(c) thermit welding (d) arc welding
75. In which of the following metals does the phenomenon of 'weld decay' occur?
(a) stainless steel (b) cast iron
(c) carbon steel (d) bronze
76. Neutral flame is used to weld
(a) cast iron (b) steel
(c) copper (d) all of the above

77. Due to which of the following reasons is welding of stainless steel difficult?
(a) formation of oxide film (b) high melting point of stainless steel
(c) fear of cracking (d) formation of rust
78. In which of the following welding processes is the non-consumable electrode used?
(a) TIG welding (b) LASER welding
(c) MIG welding (d) plasma arc welding
79. In resistance welding, pressure is released
(a) during heating period (b) after the weld cools
(c) before the weld cools (d) none of these
80. In MIG welding, metal is transformed in the form of
(a) molecules (b) molten drops
(c) weld pool (d) a fine spray of metal
81. When the cutting edge of the wedge is perpendicular to the cutting velocity, the cutting process is called
(a) axial (b) longitudinal
(c) bilateral (d) orthogonal
82. The time interval between two successive regrinds is called as
(a) cycle time (b) lead time
(c) time period (d) tool life
83. The type of chip desirable while machining more ductile materials is
(a) continuous (b) discontinuous
(c) built-up-chip (d) spiral chip
84. The angle between the side cutting edge and the side of the tool shank is called as
(a) lead angle (b) side cutting edge angle
(c) both (a) and (b) (d) none of these
85. The angle between the machined surface and underside of the tool is called
(a) nose angle (b) relief angle
(c) edge angle (d) clearance angle
86. Tool life under orthogonal cutting in comparison to oblique cutting is
(a) same (b) less
(c) more (d) none of these