

**MIZORAM PUBLIC SERVICE COMMISSION**

**TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF  
INSPECTOR OF LEGAL METROLOGY  
UNDER FOOD, CIVIL SUPPLIES & CONSUMER AFFAIRS, GOVT. OF MIZORAM  
NOVEMBER, 2023**

**MECHANICAL ENGINEERING PAPER-III**

Time Allowed : 2 hours

Full Marks : 200

*All questions carry equal marks of 2 each.*

*Attempt all questions.*

1. Haematite iron ore contains iron about
  - (a) 30%
  - (b) 45%
  - (c) 55%
  - (d) 70%
2. The property of a material due to which it breaks with little permanent distortion, is called
  - (a) brittleness
  - (b) ductility
  - (c) malleability
  - (d) plasticity
3. The coke in the charge of blast furnace
  - (a) controls the grade of pig iron
  - (b) acts as an iron-bearing mineral
  - (c) supplies heat to reduce ore and melt the iron
  - (d) forms a slag by combining with impurities
4. The cupola is used to manufacture
  - (a) pig iron
  - (b) cast iron
  - (c) wrought iron
  - (d) steel
5. Grey cast iron has
  - (a) Carbon in the form of free graphite
  - (b) high tensile strength
  - (c) low compressive strength
  - (d) all of these
6. In low carbon steels, presence of small quantities of sulphur improves
  - (a) weldability
  - (b) formability
  - (c) machinability
  - (d) hardenability
7. Killed Steels
  - (a) have minimum impurity level
  - (b) are produced by L-D process
  - (c) have almost zero percentage of phosphorus and sulphur
  - (d) are free from oxygen
8. There are fourteen atoms in a unit cell of
  - (a) body centred cubic space lattice
  - (b) face centred cubic space lattice
  - (c) close packed hexagonal space lattice
  - (d) none of these

9. 18-4-1 high speed steel contains
- (a) vanadium 4%, chromium 18% and tungsten 1%
  - (b) vanadium 1%, chromium 4% and tungsten 18%
  - (c) vanadium 18%, chromium 1 % and tungsten 4%
  - (d) none of the above
10. Which of the following iron exists at 910°C?
- (a)  $\alpha$ -iron
  - (b)  $\beta$ -iron
  - (c)  $\gamma$ -iron
  - (d)  $\delta$ -iron
11. Eutectoid reaction occurs at
- (a) 600°C
  - (b) 723°C
  - (c) 1147°C
  - (d) 1493°C
12. An eutectoid steel consists of
- (a) wholly pearlite
  - (b) wholly austenite
  - (c) pearlite and ferrite
  - (d) pearlite and cementite
13. In the austempering process of heat treatment, austenite changes into
- (a) martensite
  - (b) troostite
  - (c) sorbite
  - (d) bainite
14. The heat treatment process used for castings is
- (a) carburising
  - (b) normalising
  - (c) annealing
  - (d) tempering
15. Babbit metal is a
- (a) lead-base alloy
  - (b) copper-base alloy
  - (c) tin-base alloy
  - (d) cadmium-base alloy
16. Monel metal is an alloy of
- (a) nickel and copper
  - (b) nickel and chromium
  - (c) nickel, chromium and iron
  - (d) copper and chromium
17. The metal suitable for bearings subjected to heavy loads, is
- (a) silicon bronze
  - (b) white metal
  - (c) monel metal
  - (d) phosphor bronze
18. The ability of a material to resist fracture due to high impact loads, is called
- (a) strength
  - (b) stiffness
  - (c) toughness
  - (d) brittleness
19. The property of a material essential for spring materials is
- (a) stiffness
  - (b) ductility
  - (c) resilience
  - (d) plasticity
20. In the middle part of the blast furnace (zone of absorption), the temperature is
- (a) 400° to 700°C
  - (b) 800°C to 1000°C
  - (c) 1200°C to 1300°C
  - (d) 1500°C to 1700°C
21. A two high rolling mill consists of two rolls which rotate
- (a) at the same speed and in the same direction
  - (b) at the same speed but in opposite direction
  - (c) at different speeds and in the same direction
  - (d) at different speeds and in the opposite direction

22. Structural sections such as rails, angles, I-beams are made by  
(a) hot rolling (b) hot drawing  
(c) hot piercing (d) hot extrusion
23. The process extensively used for making bolts and nuts is  
(a) hot piercing (b) extrusion  
(c) cold peening (d) cold heading
24. A moving mandrel is used in  
(a) wire drawing (b) tube drawing  
(c) metal cutting (d) forging
25. The metal extrusion process is generally used for producing  
(a) uniform solid sections (b) uniform hollow sections  
(c) uniform solid and hollow sections (d) varying solid and hollow sections
26. Metal patterns are used for  
(a) large scale production of castings (b) large castings  
(c) small castings (d) complicated castings
27. A taper provided on the pattern for its easy and clean withdrawal from the mould is known as  
(a) machining allowance (b) shrinkage allowance  
(c) draft allowance (d) distortion allowance
28. A pattern maker's shrinkage rule considers  
(a) all pattern allowances (b) only shrinkage allowance  
(c) all materials to be cast (d) all materials of the pattern
29. In die casting, machining allowance is  
(a) small (b) large  
(c) very large (d) not provided
30. Riddle is used for  
(a) smoothing and cleaning out depressions in the mould  
(b) cleaning the moulding sand  
(c) moistening the sand around the edge before removing pattern  
(d) reinforcement of sand in the top part of moulding box
31. The property of sand due to which it evolves a great amount of steam and other gases is called  
(a) collapsibility (b) permeability  
(c) cohesiveness (d) adhesiveness
32. Green sand is a mixture of  
(a) 30% sand and 70% clay (b) 50% sand and 50% clay  
(c) 70% sand and 30% clay (d) 90% sand and 10% clay
33. The purpose of a gate is to  
(a) deliver molten metal into the mould cavity  
(b) act as a reservoir for the molten metal  
(c) feed the molten metal to the casting in order to compensate for the shrinkage  
(d) deliver molten metal from pouring basin to gate

34. The directional solidification in casting can be improved by using  
(a) chills and chaplets (b) chills and padding  
(c) chaplets and padding (d) chills, chaplets and padding
35. The casting method adopted for ornaments and toys of non-ferrous alloys, is  
(a) permanent mould casting (b) slush casting  
(c) die casting (d) centrifugal casting
36. The electrodes used in spot welding have a tip of  
(a) stainless steel (b) aluminium  
(c) copper (d) brass
37. Seam welding is a  
(a) continuous spot welding process (b) multi-spot welding process  
(c) arc welding process (d) process used for joining round bars
38. Which of the following welding method uses a pool of molten metal?  
(a) Carbon arc welding (b) Submerged arc welding  
(c) TIG arc welding (d) MIG arc welding
39. The electron beam welding can be carried out in  
(a) open air (b) a shielded gas environment  
(c) vacuum (d) a pressurised inert gas chamber
40. Acetylene gas is stored in cylinders in  
(a) solid form (b) gaseous form  
(c) liquid form (d) none of these
41. Which of the following welding process uses non-consumable electrodes?  
(a) TIG welding (b) MIG welding  
(c) Manual arc welding (d) Submerged arc welding
42. The consumable electrode is used in  
(a) carbon arc welding (b) submerged arc welding  
(c) TIG arc welding (d) MIG arc welding
43. In submerged arc welding, an arc is produced between a  
(a) carbon electrode and the work (b) metal electrode and the work  
(c) bare metal electrode and the work (d) two tungsten electrodes and the work
44. For arc welding  
(a) alternating current with high frequency is used (b) alternating current with low frequency is used  
(c) direct current is used (d) none of these
45. In arc welding, the temperature of heat produced by the electric arc is of the order of  
(a) 3000°C to 4000°C (b) 4000°C to 5000°C  
(c) 5000°C to 6000°C (d) 6000°C to 7000°C
46. In oblique cutting of metals, the Cutting edge of the tool is  
(a) perpendicular to the work piece  
(b) perpendicular to the direction of tool travels  
(c) parallel to the direction of tool travel  
(d) inclined at an angle less than 90° to the direction of tool travel

47. Continuous chips with built up edge are formed during machining of  
(a) brittle metals (b) ductile metals  
(c) hard metals (d) soft metals
48. The factor responsible for the formation of continuous chips with built up edge is  
(a) low cutting speed and large rake angle (b) low cutting speed and small rake angle  
(c) high cutting speed and large rake angle (d) high cutting speed and small rake angle
49. When the cutting edge of the tool is dull, then during machining  
(a) continuous chips are formed  
(b) discontinuous chips are formed  
(c) continuous chips with built-up edge are formed  
(d) no chips are formed
50. If the cutting speed is increased, then the built-up-edge  
(a) becomes longer  
(b) may or may not form  
(c) becomes smaller and finally does not form at all  
(d) has nothing to do with speed
51. The velocity of tool along the tool face is known as  
(a) shear velocity (b) chip velocity  
(c) cutting velocity (d) mean velocity
52. The type of tool used on lathe, shaper and planer is  
(a) single point cutting tool (b) two point cutting tool  
(c) three point cutting tool (d) multi-point cutting tool
53. The angle between the face and flank of the single point cutting tool is known as  
(a) rake angle (b) clearance angle  
(c) lip angle (d) point angle
54. Carbide tipped tools usually have  
(a) negative rake angle (b) positive rake angle  
(c) any rake angle (d) no rake angle
55. A single point thread cutting tool should ideally have  
(a) zero rake angle (b) positive rake angle  
(c) negative rake angle (d) point angle
56. Relief angles on high speed steel tools usually vary from  
(a)  $0^\circ$  to  $3^\circ$  (b)  $3^\circ$  to  $10^\circ$   
(c)  $10^\circ$  to  $20^\circ$  (d)  $20^\circ$  to  $30^\circ$
57. Crater wear occurs mainly on the  
(a) nose part, front relief face and side relief face of the cutting tool  
(b) face of the cutting tool at a short distance from the cutting edge only  
(c) cutting edge only  
(d) front face only
58. With the same tool life, the maximum material per minute is removed by  
(a) increasing the cutting speed (b) decreasing the cutting speed  
(c) increasing the depth of cut (d) increasing the feed rate

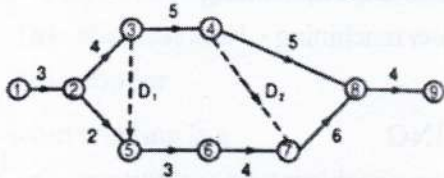
59. Jigs are used
- (a) for holding and guiding the tool in drilling, reaming or tapping operations
  - (b) for holding the work in milling, grinding, planing or turning operations
  - (c) to check the accuracy of work piece
  - (d) none of the above
60. A diamond locating pin is used in jigs and fixtures because
- (a) diamond is very hard and wear resistant
  - (b) it occupies very little space
  - (c) it helps in assembly with tolerance on centre distance
  - (d) it has a long life
61. The lathe spindles at the nose end have
- (a) internal screw threads
  - (b) external screw threads
  - (c) no threads
  - (d) tapered threads
62. Drilling is an example of
- (a) orthogonal cutting
  - (b) oblique cutting
  - (c) simple cutting
  - (d) uniform cutting
63. Threading is an operation of
- (a) smoothing and squaring the surface around a hole
  - (b) sizing and finishing a small diameter hole
  - (c) producing a hole by removing metal along the circumference of a hollow cutting tool
  - (d) cutting helical grooves on the external cylindrical surface
64. The method of grinding used to produce internal cylindrical holes and tapers, is
- (a) internal cylindrical grinding
  - (b) form grinding
  - (c) external cylindrical grinding
  - (d) surface grinding
65. In electro-discharge machining, tool is made of
- (a) brass
  - (b) copper
  - (c) copper tungsten alloy
  - (d) all of these
66. Soft materials cannot be economically grind due to
- (a) high temperature involved
  - (b) frequent wheel clogging
  - (c) rapid wheel wear
  - (d) low work piece stiffness
67. Glazing in grinding wheels takes place when the
- (a) wheel is too hard or wheel revolves at a very high speed
  - (b) wheel is too soft or wheel revolves at a very slow speed
  - (c) wheel is too hard and wheel revolves at very slow speed
  - (d) wheel is too soft and wheel revolves at a very high speed
68. In down milling, the thickness of chip is
- (a) minimum at the beginning of the cut and maximum at the end of the cut
  - (b) maximum at the beginning of the cut and minimum at the end of the cut
  - (c) uniform throughout the cut
  - (d) none of these

69. Climb milling is chosen while machining because
- (a) the chip thickness increase gradually
  - (b) it enables the cutter to dig in and start the cut
  - (c) the specific power consumption is reduced
  - (d) better surface finish can be obtained
70. Dielectric is used in
- (a) electro-chemical machining
  - (b) ultra-sonic machining
  - (c) electro-discharge machining
  - (d) laser machining
71. \_\_\_\_\_ chart is not associated with work study.
- (a) Gantt
  - (b) SINO
  - (c) Multiple activity
  - (d) None of these
72. Queuing theory is associated with which of the
- (a) Production time
  - (b) Waiting time
  - (c) Scales
  - (d) Inspection time
73. For which of the following stop watch is not needed?
- (a) R-chart
  - (b) Micromotion study
  - (c) SIMO chart
  - (d) None of these
74. The slack on various events at critical path on a PERT/CPM chart
- (a) Decreases continuously
  - (b) Increases continuously
  - (c) Remains constant
  - (d) Unpredictable
75. In CPM the performance of a specific task is known as
- (a) Activity
  - (b) Event
  - (c) Contract
  - (d) Dummy
76. Therblig in micromotion study, is described by
- (a) An event
  - (b) Colours only
  - (c) Standard symbol and colour
  - (d) Symbols.
77. Planning and control departments normally do not consist of
- (a) Inventory section
  - (b) Printing section
  - (c) Control cell
  - (d) Quality section
78. ABC analysis is used in
- (a) PERT
  - (b) CPM
  - (c) Inventory control
  - (d) All of the above
79. CPM is oriented to
- (a) Time
  - (b) Cost
  - (c) Activity
  - (d) Objective
80. Job going behind the schedule are conveniently shown in
- (a) Pie chart
  - (b) Bar chart
  - (c) Milestone chart
  - (d) Gantt chart
81. Break-even point is the point where
- (a) fixed and variable cost lines intersect
  - (b) fixed and total cost lines intersect
  - (c) variable and total cost lines intersect
  - (d) sales revenue and total expensive lines intersect

82. Earliest finish time can be regarded as
- (a) earliest start time + duration of activity
  - (b) earliest start time - duration of activity
  - (c) latest finish time + duration of activity
  - (d) latest finish time - duration of activity

83. A dummy activity in a network diagram
- (a) is represented by a dotted line
  - (b) is an artificial activity
  - (c) does not consume time or resources
  - (d) all of these

84. In a network shown in the figure, the critical path is along



- (a) 1-2-3-4-8-9
  - (b) 1-2-3-5-6-7-8-9
  - (c) 1-2-3-4-7-8-9
  - (d) 1-2-5-6-7-8-9
85. The mathematical technique for finding the best use of limited resources of a company in the maximum manner is known as
- (a) Value analysis
  - (b) network analysis
  - (c) linear programming
  - (d) queuing theory
86. In sampling plans, N indicates
- (a) Sample size
  - (b) Rejection number
  - (c) Acceptance number
  - (d) Lot size
87. Simplex method is the method used for
- (a) value analysis
  - (b) network analysis
  - (c) linear programming
  - (d) queuing theory
88. The interchangeability can be achieved by
- (a) standardisation
  - (b) better process planning
  - (c) bonus plan
  - (d) better product planning
89. Which of the following type of layout is suitable for automobile manufacturing concern?
- (a) product layout
  - (b) process layout
  - (c) fixed position layout
  - (d) combination layout
90. Bar chart is suitable for
- (a) large project
  - (b) major work
  - (c) minor work
  - (d) all of these
91. Which of the following are the guidelines for the construction of a network diagram?
- (a) Each activity is represented by one and only one arrow in the network.
  - (b) Dangling must be avoided in a network diagram.
  - (c) Dummy activity consumes no time or resource.
  - (d) all of the above
92. PERT is applied for
- (a) marketing programmes and advertising programmes
  - (b) installation of machinery
  - (c) research and development of products
  - (d) all of these



93. CPM stands for
- (a) Combined Process Method
  - (b) Critical Path Method
  - (c) Common Planning Method
  - (d) Critical Process Method
94. In break even analysis, total cost consists of
- (a) fixed cost + sales revenue
  - (b) variable cost + sales revenue
  - (c) fixed cost + variable cost
  - (d) fixed cost + variable cost + profit
95. Time study is carried out to determine the time required to complete job by
- (a) a slow worker
  - (b) a fast worker
  - (c) an average worker
  - (d) an apprentice
96. A feasible solution to the linear programming problem should
- (a) satisfy the problem constraints
  - (b) optimise the objective function
  - (c) satisfy the problem constraints and non-negativity restrictions
  - (d) satisfy the non-negativity restrictions
97. In value engineering, important consideration is given to
- (a) customer satisfaction
  - (b) function concept
  - (c) profit maximisation
  - (d) cost reduction
98. Value analysis is particularly of interest when
- (a) jobbing work economics are involved
  - (b) production is on large scale
  - (c) only few components are involved
  - (d) costly equipment is used
99. The concept of prevention and control comes under
- (a) Managerial
  - (b) Engineering
  - (c) Statistical
  - (d) Planning
100. Material handling is more in case of \_\_\_\_\_ inspection.
- (a) Patrol
  - (b) First piece
  - (c) Floor
  - (d) Centralised

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