

MIZORAM PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATIONS FOR JUNIOR GRADE OF M.E.S.
UNDER POWER & ELECTRICITY DEPARTMENT, AUGUST, 2018.

MECHANICAL ENGINEERING
PAPER - III

Time Allowed : 3 hours

FM : 200

SECTION - A (Multiple Choice questions)

(100 Marks)

All questions carry equal mark of 2 each. Attempt all questions.

*This Section should be answered only on the **OMR Response Sheet** provided.*

1. Mild steel belongs to the category
 - (a) no carbon steel
 - (b) low carbon steel
 - (c) high carbon steel
 - (d) medium carbon steel
2. C-14 steel designation means that carbon content in steel is of order of
 - (a) 0.1%
 - (b) 0.1 to 0.18%
 - (c) 1%
 - (d) 4%
3. Cast irons are generally specified by
 - (a) percentage of carbon content
 - (b) method of manufacture
 - (c) tensile strength
 - (d) process of heat treatment
4. Cast iron is
 - (a) tough
 - (b) ductile
 - (c) resilient
 - (d) wear resistant
5. Martensite is a super-saturated solution of carbon
 - (a) α - iron
 - (b) β - iron
 - (c) γ - iron
 - (d) δ - iron
6. Austenite is a solid solution of carbon in
 - (a) α - iron
 - (b) β - iron
 - (c) γ - iron
 - (d) δ - iron
7. Which one of the following sets of constituents is expected in equilibrium cooling of a hyper- eutectoid steel from austenitic state
 - (a) ferrite and pearlite
 - (b) cementite and pearlite
 - (c) ferrite and bainite
 - (d) cementite and martensite
8. Carbon steel is
 - (a) extremely hard
 - (b) refined form of cast iron
 - (c) made by adding carbon in steel
 - (d) an alloy of iron and carbon with varying quantities of sulphur and phosphorous

9. Cast steel crank shaft surface is hardened by
(a) nitriding (b) normalising
(c) carburising (d) induction heating
10. Age hardening is related to
(a) brass (b) duralumin
(c) muntz metal (d) white metal
11. Aeroplane and certain automobile parts are usually made of
(a) magnalium (b) aluminium bronze
(c) duralumin (d) german silver
12. Wood is
(a) homogeneous material (b) granular material
(c) amorphous material (d) cellular material
13. Gypsum is chemically
(a) calcium chloride (b) calcium sulphate
(c) sodium sulphate (d) potassium sulphate
14. Which is the closest to purest form of iron
(a) cast iron (b) wrought iron
(c) grey iron (d) mild steel
15. Ductile iron is another name given to
(a) nodular cast iron (b) malleable cast iron
(c) grey cast iron (d) white cast iron
16. In blanking operation, the angle of shear is provided on
(a) die only (b) punch only
(c) both on die and punch (d) depends on the material of work piece
17. In sheet metal work, the cutting force on the tool can be reduced by
(a) grinding the cutting edge sharp (b) increasing the hardness of tool
(c) providing the shear angle on the tool (d) increasing the hardness of die
18. In sheet metal working, shear is provided on punches and dies so that
(a) press load is reduced (b) good cut edge is obtained
(c) warping of sheet is minimised (d) cut blanks are straight
19. All of the following are cold working processes, except
(a) slitting (b) blanking
(c) extrusion (d) lancing
20. 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
21. Dies for wire drawing are made of
(a) cast iron (b) wrought iron
(c) mild steel (d) carbides

22. Copper sheets are manufactured by
- (a) drawing
 - (b) rolling
 - (c) extruding
 - (d) hammering
23. The property of a material by which it can be rolled into sheets is called
- (a) elasticity
 - (b) plasticity
 - (c) ductility
 - (d) malleability
24. All the following are squeezing processes, except
- (a) stamping
 - (b) swagging
 - (c) trimming
 - (d) crimping
25. Blanking and drawing operations can be performed at one station of the press in every stroke of the ram in a
- (a) simple die
 - (b) combination die
 - (c) compound die
 - (d) progressive die
26. In sand moulding, the top flask is known as
- (a) cope
 - (b) drag
 - (c) fillet
 - (d) cheek
27. The tool used for lifting the pattern from the mould is called
- (a) lifter
 - (b) slick
 - (c) draw spike
 - (d) trowel
28. Spot welding, projection welding and seam welding belong to the category of
- (a) arc welding
 - (b) thermit welding
 - (c) forge welding
 - (d) electric resistance welding
29. Which one of the following is not a fusion welding process
- (a) gas welding
 - (b) arc welding
 - (c) brazing
 - (d) resistance welding
30. Identify the single point cutting tool
- (a) milling cutter
 - (b) hacksaw blade
 - (c) grinding wheel
 - (d) cutting tool used in slotting machine
31. In what way increase in productivity helps the management
- (a) better working condition
 - (b) to stand better in market
 - (c) job security and satisfaction
 - (d) reduced price of articles
32. Line balancing is carried out to
- (a) minimise the idle items
 - (b) optimise no. of lines in network
 - (c) balance the level of outgoing product against the level of incoming raw material
 - (d) decide the type of plant layout
33. Production cost refers to the prime cost plus
- (a) factory overheads
 - (b) factory and administrative heads
 - (c) factory, administration and sales overhead
 - (d) factory administration and sales heads and profit

34. Job evaluation is the method of determining
- (a) utility of a product
 - (b) worth of a machine to perform specified task
 - (c) relative value of a job
 - (d) worker's performance on a job
35. A CPM network is
- (a) activity oriented
 - (b) event oriented
 - (c) both activity and event oriented
 - (d) neither activity nor event oriented
36. Identify the PERT event
- (a) engine is being assembled
 - (b) blue prints are under preparation
 - (c) foundation excavation completed
 - (d) site for plant location is being surveyed
37. CPM and PERT techniques are used for
- (a) layout planning
 - (b) financial management
 - (c) executing a new project
 - (d) increasing productivity
38. Production of an enterprise refers to
- (a) yearly gross income
 - (b) rate of growth of capital
 - (c) turnover in a specified period
 - (d) the ratio of gross income to gross expenditure
39. Micro motion study is
- (a) motion study as seen on a time chart
 - (b) enlarged view of motion study
 - (c) subdivision of an operation in therbligs and their analysis
 - (d) analysis of one stage of motion study
40. MTM (Method-Time-Management) is a work measurement technique by
- (a) stopwatch study
 - (b) work sampling study
 - (c) predetermined motion time systems
 - (d) past data comparison
41. Standard time is
- (a) normal time + allowances
 - (b) (normal time X rating) + allowances
 - (c) (normal time/rating) + allowances
 - (d) normal + (allowances X rating)
42. Break-even analysis is associated with
- (a) formulation of proper incentive scheme
 - (b) fixation of sales volume to earn a given profit
 - (c) synthesis of alternative methods of achieving the desired objective
 - (d) compact estimate of material handling to be done between various work stations
43. Break-even point is the point where
- (a) fixed and variable cost lines intersect
 - (b) variable and total cost lines intersect
 - (c) total cost and fixed lines intersect
 - (d) total cost and sales revenue lines intersect

44. In PERT and CPM network, the dummy activity
- (a) consumes time
 - (b) consumes resources
 - (c) is used to preserve the logic
 - (d) is a real activity
45. Dummy activities are used in a network to
- (a) facilitate the computation of slacks
 - (b) satisfy precedence requirements
 - (c) determine project completion time
 - (d) avoid use of resources
46. The capacity of a metal to exhibit considerable elastic recovery upon release of load is known as
- (a) Creep
 - (b) Fatigue
 - (c) Impact strength
 - (d) Stiffness
47. Which of the following is not an ore of nickel?
- (a) Nickel glance
 - (b) Garneirite
 - (c) Haematite
 - (d) Pentlandite
48. The process of decreasing the cross-section of a bar and increasing its length is called
- (a) Drawing down
 - (b) Upsetting
 - (c) Spinning
 - (d) Peening
49. The process extensively used for making bolts and nuts
- (a) Hot piercing
 - (b) Extrusion
 - (c) Shot peening
 - (d) None
50. 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

SECTION - B (Short answer type question)

(100 Marks)

All questions carry equal marks of 5 each.

*This Section should be answered only on the **Answer Sheet** provided.*

1. Explain the concepts of lattice, basis and crystal structure. How are they related?
2. What is heat treatment?
3. What is the use of time-temperature transformation (T-T-T) curves?
4. What is hardenability?
5. What do you understand by work hardening?
6. What is the function of grain boundaries?
7. What is difference between crystalline and non-crystalline solids?
8. What are point defects?
9. What is a pattern? Name the various allowances associated with patterns.
10. Distinguish between welding, brazing and soldering.
11. Describe some common welding defects.
12. Bring out the difference between punching and blanking.
13. Differentiate between extrusion and drawing processes.
14. What are the differences between hot rolled and cold rolled products?
15. What is the difference between PERT and CPM.
16. What is the difference between work study and motion study?
17. Differentiate between Fatigue and Creep.
18. Define Mild Steel. How is it different from Cast Iron?
19. Explain the defects in casting with their reasons. How these defects can be prevented?
20. Sketch, differentiate and describe the following briefly.
 - (i) Neutral flame
 - (ii) Carburizing flame
 - (iii) Oxidizing flame

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