

MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO JUNIOR ENGINEER (J.E) (CONTRACT) UNDER PUBLIC HEALTH ENGINEERING DEPARTMENT, APRIL, 2016

MECHANICAL ENGINEERING PAPER - I

Time Allowed : 2 hours

Full Marks : 150

Attempt all questions.

All questions carry equal marks of 2 each.

1. A measure of the deformation produced in the member by the load is
 - (a) Strain
 - (b) Stress
 - (c) Elongation
 - (d) None of these
2. Stresses which are normal to the plane on which they act are called
 - (a) Direct stresses
 - (b) Indirect stresses
 - (c) Proof stresses
 - (d) None of these
3. The ratio of the direct stress to the strain produced is called
 - (a) Shear modulus
 - (b) Rigidity
 - (c) Young's modulus
 - (d) None of these
4. The law, which states that strain is proportional to the stress producing it, is called
 - (a) Newton law
 - (b) Hooke's law
 - (c) Goodman's law
 - (d) None of these
5. The ratio between lateral strain to longitudinal strain produced by a single stress is called
 - (a) Principal ratio
 - (b) Poisson's ratio
 - (c) Bending ratio
 - (d) None of these
6. The stresses on the principal planes will be pure normal (tension or compression) and their values are called
 - (a) Principal stresses
 - (b) Safe stresses
 - (c) Shear stresses
 - (d) None of these
7. Any member of a structure which is in compression may be called
 - (a) A column
 - (b) A truss
 - (c) A strut
 - (d) None of these
8. A process of joining similar metals by application of heat with or without application of pressure and addition of filler material is called
 - (a) Smithing
 - (b) Forging
 - (c) Pattern making
 - (d) Welding
9. The standard gravity force on 1 kg is
 - (a) 9.81 N
 - (b) 10 N
 - (c) 9.81 kg
 - (d) None of these

10. The ratio between the ultimate tensile stress and the working stress is called
- (a) Poisson's ratio
 - (b) Factor of safety
 - (c) Strength of material
 - (d) None of these
11. The shear stress is tangential to the area over which it acts
- (a) True
 - (b) False
 - (c) Both (a) & (b)
 - (d) None of these
12. Things which are used to fasten the various parts of an assembly together are called
- (a) Bolts and screws
 - (b) Springs
 - (c) Bearings
 - (d) None of these
13. Which of the following is/are not included in examples of machine element that employ friction for transfer of energy
- (a) Belts
 - (b) Brakes
 - (c) Clutches
 - (d) Fuel tank
14. Which of the following does not form part of belts?
- (a) Flat belt
 - (b) Chain
 - (c) Belt
 - (d) V - Belt
15. Grease cannot be used as a lubricant for the lubrication of
- (a) Front wheel bearings
 - (b) Input shaft
 - (c) Coolant pump
 - (d) Transmission
16. Which transmission unit disengages the drive and provides a smooth take up the drive?
- (a) Final drive
 - (b) Differential
 - (c) Clutch
 - (d) Gearbox
17. A clutch is
- (a) A friction device which permits the connection and disconnection of shafts
 - (b) A device to reduce the speed
 - (c) A part of machine which supports the body
 - (d) None of these
18. The maximum and minimum pressure in a plate clutch where the axial force is 1000 lb (the inside radius of contact is $R_i = 2$ in, the outside radius is $R_o = 4$ in) is 39.8 psi and 19.9 psi respectively. If uniform wear is assumed, the Average pressure is
- (a) 29.85 psi
 - (b) 26.5 psi
 - (c) 19.9 psi
 - (d) None of these
19. Brakes are machine elements
- (a) that absorb either kinetic or potential energy in the process of slowing down or stopping moving parts
 - (b) that permits the connection and disconnection of shafts
 - (c) to store fuel
 - (d) None of these
20. The permissible maximum value of operating temperature for metal on metal material for the Brake is
- (a) 300° F
 - (b) 400° F
 - (c) 500° F
 - (d) 600° F

21. Flat belts and V-belts may be employed
- (a) to transmit mechanical power from one shaft to electrical power
 - (b) to transmit power from one shaft to another where it is not necessary to maintain an exact speed ratio between the two shafts
 - (c) to stop the engine
 - (d) None of these
22. The power (in horse power) transmitted by a belt drive is
- T_1 = belt tension in tight side
 T_2 = belt tension in loose side and
 V = belt speed
- (a) Power = $\frac{(T_2 - T_1)V}{550}$
 - (b) Power = $\frac{(T_2 - T_1)550}{V}$
 - (c) Power = $\frac{(T_1 - T_2)V}{550}$
 - (d) None of these
23. For balancing single cylinder engine, a counter weight is added to
- (a) Gudgeon pin
 - (b) Piston
 - (c) Connecting rod
 - (d) Crankshaft
24. In factories the power or rotary motion from one shaft to another is usually transmitted by means of
- (a) Crankshaft
 - (b) Belts or ropes
 - (c) H.T lines
 - (d) None of these
25. Which one is not type of belts?
- (a) Flat belt
 - (b) Circular belt or rope
 - (c) Vee belt
 - (d) Chain
26. The main rotating parts which are to be balanced mechanically are
- (a) Inlet valve & outlet valve
 - (b) Piston & Piston ring
 - (c) Crankshaft & Flywheel
 - (d) None of these
27. The operation of removing trapped air from hydraulic braking system is known as
- (a) Tapping
 - (b) Trapping
 - (c) Bleeding
 - (d) Pressurization
28. The device for smoothing out the power impulses from the engine is called
- (a) Clutch
 - (b) Differential
 - (c) Flywheel
 - (d) Torque converter
29. A governor is a device
- (a) to control temperature variation
 - (b) to slowdown the speed
 - (c) to control speed variation in an engine and controls the amount of fuel to an engine to match the load requirement to maintain in a specific speed
 - (d) None of these
30. The length, breadth and depth of a water container is 3m, 2m and 1m respectively, the volume is
- (a) 600 litres
 - (b) 3000 litres
 - (c) 2000 litres
 - (d) None of these

31. The machine element which provides a convenient means for transforming rotary motion into reciprocating motion is
- (a) Spur gear (b) Spring
(c) Cam (d) None of these
32. Which of the following statement is true?
- (a) Worm gearing is widely used to transmit power at high velocity ratios between non-intersecting shafts that are usually, but not necessarily, at right angles
(b) Spur gearing is widely used to transmit power at high velocity ratios between non-intersecting shafts that are usually, but not necessarily, at right angles.
(c) Vee belt is widely used to transmit electrical power.
(d) None of these
33. Power may be transmitted between parallel shafts by means of
- (a) Worm gears (b) Clutches
(c) Roller chains (d) None of these
34. Which of the following is not a type of Boring machine?
- (a) Slotting machine (b) Jig boring machine
(c) Horizontal boring machine (d) Vertical boring machine
35. A machine tool that removes metal as the work is fed against a rotating multipoint cutter is
- (a) Grinding machine (b) Boring machine
(c) Gear hobbing machine (d) Milling machine
36. Which is not column & knee type milling machine?
- (a) Hand milling machine (b) Plain milling machine
(c) Triplex milling machine (d) Vertical milling machine
37. Which is not one of the principal parts of a Column & Knee type of milling machine?
- (a) Piston ring (b) Knee
(c) Base (d) Column
38. A machine used to bore holes in large and heavy parts such as engine frame, steam engine cylinders, machine housing etc. is
- (a) Grinding machine (b) Boring machine
(c) Planing machine (d) Milling machine
39. A machine in which a metal cutting operation is performed by means of a rotating abrasive wheel that acts as a cutting tool and is used to finish workpiece which must show a high surface quality, accuracy of shape and dimension is
- (a) Drilling machine (b) Grinding machine
(c) Boring machine (d) None of these
40. Which of the following is not a precision grinder?
- (a) A brasive belt grinder (b) Surface grinder
(c) Cylinder grinder (d) Internal grinder
41. Which is not one of principal parts of capstan & turret lathe?
- (a) Hexagonal turret (b) Headstock
(c) Lathe bed (d) Knee

42. A production lathe which is used to manufacture any number of identical pieces in the minimum time is
- (a) Engine lathe (b) A capstan and turret lathe
(c) Speed lathe (d) None of these
43. A process of generating a gear by means of a cutter that revolves and cuts like a milling cutter is called
- (a) Rack cutter process (b) Gear hobbing
(c) Slotting (d) None of these
44. Heat treatment refers to a combination of processing of a metal or alloy in the solid state for the purpose of obtaining desired properties
- (a) Balancing & Wiring (b) Heating & Cooling
(c) Welding & Lighting (d) None of these
45. What type of annealing consists of - heating the steel slightly above the critical point, holding it at that temperature for a considerable period & slowly cooling?
- (a) Spheroidise annealing (b) Process annealing
(c) Full annealing (d) None of these
46. In forging operation of cutting tools of carbon steel, the operation should be carried out at
- (a) 850 to 950°C (b) 950 to 1050°C
(c) 1050 to 1150°C (d) None of these
47. The melting point of pure iron is
- (a) 1355°C (b) 1500°C
(c) 1553°C (d) 1535°C
48. In forging operation of high speed steel, the operation should be carried out at
- (a) 900 to 1100°C (b) 1100 to 1300°C
(c) 1300 to 1500°C (d) None of these
49. Cutting work of iron and steel with the aid of oxygen which is extensively used nowadays in industry is
- (a) Oxygen cutting (b) Arc cutting
(c) Electric cutting (d) None of these
50. Which of the following does not form a part of equipments which are commonly used for electric arc welding?
- (a) Electrode (b) Gas
(c) AC or DC machine (d) Cable lug
51. A welding which is done by burning a combustible gas with air or oxygen in a concentrated flame of high temperature is
- (a) Braze welding (b) Electric welding
(c) Gas welding (d) Arc welding
52. A method of uniting two or more pieces of metal by means of a fusible alloy or metal, applied in the molten state is
- (a) Welding (b) Soldering
(c) Balancing (d) None of these

53. A process of joining similar metal by rivet is called
- (a) Welding
 - (b) Balancing
 - (c) Rivetting
 - (d) None of these
54. Which of the following does not form part of the effects which were obtained by Annealing process?
- (a) Soften the steel
 - (b) Relieve internal stresses
 - (c) Improve machinability
 - (d) None of these
55. Heat treatment of steel does not include which of the following processes?
- (a) Spheroidising
 - (b) Normalising
 - (c) Supercharging
 - (d) Tempering
56. The Equilibrium diagrams of alloys indicate the following
- (a) Temperature at which the solid alloy will start melting & finish melting.
 - (b) Possible phase changes which will occur as the result of altering the composition or temperature.
 - (c) The percentage of increase of melting temperature of alloy
 - (d) Both (a) & (b)
57. A metal cannot exist in the
- (a) Gaseous state
 - (b) Liquid state
 - (c) Solid state
 - (d) None of these
58. _____ is generally done to improve machinability of steel.
- (a) Tempering
 - (b) Annealing
 - (c) Normalising
 - (d) Cyaniding
59. The most rapid method of forming metal into desired shapes by plastic deformation in between rolls is
- (a) Tempering
 - (b) Rolling
 - (c) Hardening
 - (d) None of these
60. The process which keeps the actual standard as nearby as possible to the predetermined standards by strict supervision is known as
- (a) Budgetary control
 - (b) Physical control
 - (c) Production control
 - (d) None of these
61. The specification for the shapes, sizes and finishes are furnished to the shop by part drawings or manufacturing drawings. These specifications are often called
- (a) Quality characteristics
 - (b) Standard measurements
 - (c) Engineering drawings
 - (d) None of these
62. The basic philosophy of quality control is
- (a) Frequent inspection
 - (b) Both preventive & remedial
 - (c) Only preventive
 - (d) None of these
63. Inspection is considered to be a tool of
- (a) Quality control
 - (b) Material management
 - (c) Production control
 - (d) Plant layout
64. Certain statistical techniques have been derived to evaluate machines, materials and processes by observing capabilities and trends so that continual analysis and predictions may be made to control the desired quality level. The statistical techniques are called
- (a) Fundamental of statistics
 - (b) Statistical quality control methods
 - (c) Sampling inspection
 - (d) None of these

65. Which of the following is not basic area of inspection?
(a) Receiving inspection (b) Final inspection
(c) Inprocess inspection (d) Production
66. The method of measuring and/or checking the quality of a product in terms of specified standard
(a) Manufacturing (b) Material handling
(c) Inspection (d) None of these
67. What is a prime consideration in designing the new plant building?
(a) Material handling (b) Drawings
(c) Machine loading (d) Value engineering
68. Which of the following is not part of important factors which are required to be considered for selection of exact plant location?
(a) Easy access
(b) Availability of cheap, sufficient and suitable land
(c) Cost of material required for construction
(d) None of these
69. Which of the following is not part of important steps for project planning?
(a) Market survey (b) Project capability
(c) Selection of site (d) None of these
70. Which of the following is not part of major factors of production?
(a) Land (b) Labour & Capital
(c) Machinery (d) None of these
71. The tools which are used for checking the size, shape and relative positions of various parts but not provided with graduated adjustable members are
(a) Gauges (b) Measuring tape
(c) Laser (d) None of these
72. Which are widely used length standards?
(a) Kilometre & furlong
(b) International standard metre & Imperial standard yard
(c) Centimetre & inch
(d) None of these
73. The measuring devices, which enable the position of a surface to be determined with respect to horizontal and are widely used for the static levelling of machinery and other equipment are
(a) Spirit levels (b) Angle gauges
(c) Bevel protractor (d) Sine bar
74. The maximum permissible variation in the size of the part is
(a) Basic dimensions (b) Tolerance
(c) Clearance (d) None of these
75. Metal fits be specified to ensure the proper assembly of mating machine members
(a) Statement is true (b) Statement is false