

MIZORAM PUBLIC SERVICE COMMISSION
DEPARTMENTAL EXAMINATION FOR JUNIOR GRADE OF M.E.S. (AE/SDO)
UNDER PUBLIC HEALTH ENGINEERING DEPARTMENT,
GOVERNMENT OF MIZORAM.
(JULY, 2025)

ENGINEERING PAPER – II
MECHANICAL ENGINEER

Time Allowed : 3 hours

FM : 100 PM : 40

SECTION - A (Multiple Choice questions) (50 Marks)

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

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

1. The turning effects produced by a force on the body on which it acts is called-
(a) Moment of force (b) Acceleration
(c) Weight (d) Mass
2. The motion of piston in the cylinder of Steam engine is an example of-
(a) Complete constraint motion (b) Curvilinear motion
(c) Rotary motion (d) Static motion
3. A connection between elements which maintain a fixed relative position behaving as a single rigid body during simulation is called-
(a) Flexible link (b) Thermal link
(c) Rigid link (d) Fluid link
4. The force that opposes motion when body slides over another is referred as-
(a) Constant (b) Friction
(c) Variable (d) Charger
5. The branch of theory of machines which deals with the forces and their effects while acting on the machine part in motion is called-
(a) Static (b) Stationary
(c) Dynamo (d) Dynamics
6. A chemical process where fuel reacts with oxygen releasing energy in the form of heat and light is called-
(a) Fuel Combustion (b) Vacuum
(c) Carbon Dioxide (d) Non Combustible
7. The amount of heat released when a unit quantity of fuel is completely combusted is termed as-
(a) Preheater (b) Non Combustible
(c) Constant Chemical (d) Calorific Value

8. The expanding gases in the combustion chamber of an engine push the piston connected to crank shaft create-
- (a) Power stroke
 - (b) Compression stroke
 - (c) Connecting rod
 - (d) Crusher
9. Oil pump, oil sump & oil filter are the key components of-
- (a) Combustion system
 - (b) Engine lubrication system
 - (c) Fuel system
 - (d) Breaking system
10. IC engines can use variety of fuel including-
- (a) Gasoline & Diesel
 - (b) Wood
 - (c) Charcoal
 - (d) Coal
11. A field that applies scientific method to solve complex problem in various field including management and business is-
- (a) Network
 - (b) Definition
 - (c) Operation research
 - (d) Satisfaction
12. Benefits of operation research-
- (a) Increase efficiency
 - (b) Decrease efficiency
 - (c) Difficulties in solution finding
 - (d) Worsened resource allocation
13. The chemical used for disinfecting water supply is-
- (a) Hydrochloric Acid
 - (b) Chlorine
 - (c) Nitric Acid
 - (d) Bromide
14. A facility designed to remove impurities, contamination and harmful substance from water is called-
- (a) Water Treatment Plant
 - (b) Water Pumping Plant
 - (c) Gravity System
 - (d) Distribution Tank
15. The process of reversing water flow in the filter and adding compressed air to agitate sand bed to dislodge the topped solid to be flushed out is called-
- (a) Filter backwashing
 - (b) Filter front washing
 - (c) Constant filter
 - (d) Variable filter
16. A welding process where an electrical arc is created between a continuously fed electrode and the work piece is called-
- (a) Gas metal Arc Welding (GMAW)
 - (b) Resistance welding
 - (c) Gas Welding
 - (d) Tungsten Welding
17. A welding process that uses flux blanket to shield the weld is called-
- (a) Gas welding
 - (b) Submerged Arc Welding
 - (c) Tungsten inert gas welding
 - (d) Stick Welding
18. A thermal cutting process that uses mixture of fuel, gases and oxygen to cut metals is called-
- (a) Oxy-fuel cutting
 - (b) Welding
 - (c) Metal Arc
 - (d) TIG
19. Brazing is ideally suited for joining of-
- (a) Dissimilar Metals
 - (b) Wood & Metal
 - (c) Two Wooden Pieces
 - (d) Wood & Plastic

- 20.** Oxy-fuel cutting is the popular method for cutting-
- (a) Wood
 - (b) Plastic
 - (c) Thick Steel Plate
 - (d) Wooden Thick Plate
- 21.** An iron having superior corrosion resistance due to zinc coating is called-
- (a) Forged iron
 - (b) Galvanised Iron
 - (c) Tinning
 - (d) Cast Iron
- 22.** A steel pipe that exhibits high strength, durability and corrosion resistance due to the process of forming them from steel coils are known as-
- (a) ERW pipes
 - (b) Square pipes
 - (c) Tin
 - (d) Cast Iron
- 23.** A cast iron alloy with unique properties including high strength ductility and durability is known as-
- (a) Corrosion
 - (b) Copper
 - (c) Ductile iron
 - (d) Metallic
- 24.** The temperature at which steel transitions from a solid to liquid is-
- (a) Corrosive point
 - (b) Coating
 - (c) Translation
 - (d) Melting Point
- 25.** Pipes that are made using high frequency currents to form a bond between the edges of a metal is known as-
- (a) ERW pipes
 - (b) PVC pipes
 - (c) UPVC pipes
 - (d) CPVC pipes
- 26.** NPSH testing determines the pump ability to handle suctions conditions and-
- (a) Prevents cavitation
 - (b) Head
 - (c) Current
 - (d) Weight
- 27.** Testing method focussing on measuring temperature, power consumed and differential pressure to assess pump efficiency is called-
- (a) Head testing
 - (b) Discharge testing
 - (c) Vibration testing
 - (d) Thermodynamic testing
- 28.** Seal leak testing is used to asses the integrity of the seals that prevent pumps-
- (a) Weight
 - (b) Leakage
 - (c) Thermal
 - (d) Vibration
- 29.** A pump type that combines radial and axial flow, producing a conical flow pattern around the shaft is called-
- (a) Single flow pump
 - (b) Mixed flow pump
 - (c) Unidirectional
 - (d) Pump curve
- 30.** Vertical centrifugal pumps are also called-
- (a) Bilateral pump
 - (b) Vertigo
 - (c) Negative pump
 - (d) Cantilever pumps
- 31.** Operation and maintenance of DG set includes replacement of lubricating oil and filter every-
- (a) 600 hours of operation
 - (b) 50 hours of operation
 - (c) 20 hours of operation
 - (d) 10 hours of operation

- 32.** For maintenance of battery, check electrolyte levels and-
- (a) Position
 - (b) Inclination
 - (c) Weight
 - (d) Specific gravity
- 33.** Cooling system of DG set has to be checked regularly to prevent-
- (a) Moisture
 - (b) Overheating
 - (c) Run hours
 - (d) Resistance
- 34.** Electric motor typically consists of rotor and-
- (a) NPSH
 - (b) Head
 - (c) Water
 - (d) Stator
- 35.** A DG set works by converting the chemical energy of diesel fuel into-
- (a) Moisture
 - (b) Strength
 - (c) Electrical energy
 - (d) Hydrology
- 36.** Pump and equipment in pump house are typically laid out to maximise efficiency and-
- (a) Accessibility and safety
 - (b) Minimise area
 - (c) Maximise project area
 - (d) Maximise accidents
- 37.** In pump house, monitoring and controlling of pumps including start/stop functions, flow rate and alarms is done by using-
- (a) Substation
 - (b) Control panel
 - (c) Transformer
 - (d) Isolator
- 38.** Selection and layout plan of water pumping station includes a thorough evaluation of flood plains and potential flooding to determine-
- (a) Flood risk
 - (b) Quantity of water
 - (c) Moisture
 - (d) Pump head
- 39.** The arithmetic increase method of population projection is calculated by adding average population increase per decade to the-
- (a) Current population
 - (b) Previous population
 - (c) Average population
 - (d) Project population
- 40.** The geometric increase method is useful for forecasting population in-
- (a) Rapidly developing areas
 - (b) Warm areas
 - (c) Declining population areas
 - (d) Constant population area
- 41.** A water distribution system is a network that transport treated or untreated water from a source to-
- (a) Reservoir
 - (b) Gravity
 - (c) Pumping
 - (d) Consumer
- 42.** Friction loss in pipe increases with the length and diameter of the pipe and-
- (a) Direction of the fluid
 - (b) Velocity of the fluid
 - (c) Acceleration of fluid
 - (d) Constant fluid
- 43.** The total head is the total energy required to move the fluid including friction head loss in the pipe and-
- (a) Static head
 - (b) Atmospheric pressure
 - (c) Temperature
 - (d) Thermal effect

44. The head loss due to fittings, valves and changes in the pipe diameter or direction is called-
- (a) Static head
 - (b) Recoverable loss
 - (c) No loss
 - (d) Minor loss
45. Machines that enlarge or refine existing holes in a material like wood, metal or concrete are called-
- (a) Clipping Machine
 - (b) Boring machine
 - (c) Sewing machine
 - (d) Cutting machine
46. A machine that uses an abrasive to remove material from a workpiece, shaping and finishing it to a desired form is called-
- (a) Compacting machine
 - (b) Grinding machine
 - (c) Drilling machine
 - (d) Crimping machine
47. One of the abrasive materials used in grinding machine wheel is-
- (a) Aluminium oxide
 - (b) Cotton
 - (c) Sand
 - (d) Wood
48. A machine that shape materials by rotating them against a cutting tool which allows various operations like turning, facing, threading, drilling etc is called-
- (a) Testing machine
 - (b) Drilling machine
 - (c) Cutting machine
 - (d) Lathe machine
49. Main types of air compressors are reciprocating, rotary and-
- (a) Centrifugal
 - (b) Artificial
 - (c) Magnetic
 - (d) Potential
50. Hydrostatic testing of pump involves pressurizing the pump casing to ensure it can withstand-
- (a) Weight
 - (b) Suction
 - (c) Operating pressure
 - (d) Position

SECTION - B (Conventional Type) (50 Marks)

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

Marks for each question is indicated against it.

Direction (Question Nos. 1 - 8) Answer any five (5) of the following questions –

1. What is motion in the context of Theory of Machine? Explain with example, the following types of motion. (2+3=5)
(a) Translation (b) Rotation
(c) Oscillatory
2. Define friction and describe the factors effecting frictions. (2+3=5)
3. Define IC Engines. Describe the working of CI & SI Engine (1+4=5)
4. What is lubrication in engine? Describe the advantages of using lubricant in an engine? (1+4=5)
5. Describe the uses of PERT and CPM in Operation Research. (2+3=5)
6. What is water supply plan management? Describe the main features of water supply management plant. (1+4=5)
7. What is soldering? Describe the features of soldering process. (2+3=5)
8. Describe the process of Shielded Metal Arc Welding (SMAW) and it advantages for welding water pipes. (2+3=5)

Direction (Question Nos. 9 - 16) Answer any five (5) of the following questions –

9. What is pump? Describe the different types of pump. (2+3=5)
10. Describe the key parameters for selection of pump. (5)
11. Describe the procedures for operation and maintenance of electric motor. (5)
12. Describe the key aspect for maintenance and operation of pumps. (5)
13. Describe the selection criteria and layout planning of water pumping station. (5)
14. Calculate water demand in MLD for a population of 25000 souls at a water supply level of 55 lpcd. (5)
15. What is grinding machine? Describe its applications. (2+3=5)
16. Explain the working principle of air compressor and its uses. (2+3=5)

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