

MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF JUNIOR ENGINEER UNDER PUBLIC HEALTH ENGINEERING DEPARTMENT, GOVERNMENT OF MIZORAM. JUNE-2019

MECHANICAL ENGINEERING

PAPER - II

Time Allowed : 2 hours

Full Marks : 150

Attempt all questions.

All questions carry equal marks of two (2) each

- The flows of an unbounded fluid over a surface is called
 - External flow
 - Internal flow
 - Open flow
 - Normal flow
- “The intensity of pressure at any point in a fluid, at rest is the same in all direction”. It is
 - Planck’s law
 - Pascal’s law
 - Chezy’s law
 - Archimedes principal
- The flow in which the volume and the density of the following fluid does not change during the flow is called
 - Compressible flow
 - Turbulent flow
 - Non-uniform flow
 - Incompressible flow
- The flow in a river during the period of heavy rainfall is
 - Steady, uniform, two-dimensional
 - Unsteady, uniform, three-dimensional
 - Unsteady, non-uniform, three-dimensional
 - Steady, non-uniform, three-dimensional
- Water hammer is a phenomenon which is caused by
 - Sudden opening of a valve in a pipeline
 - Sudden closure (partial or complete) of a valve in a pipeline
 - Incompressibility of fluid
 - The pipeline material being elastic
- Hydraulic efficiency of the turbine is the ratio of
 - $\frac{\text{Power developed by the runner}}{\text{Net power supplied at the turbine entrance}}$
 - $\frac{\text{Net power supplied at the turbine entrance}}{\text{Power developed by the runner}}$
 - $\frac{2 \text{ X Net power supplied at the turbine entrance}}{\text{Net power generated}}$
 - All of these

7. Mechanical efficiency of the turbine is the ratio of
- | | |
|--|--|
| (a) $\frac{\text{Power developed by the runner}}{\text{Power available at the turbine shaft}}$ | (b) $\frac{\text{Power available at the turbine shaft}}{\text{Power developed by the runner}}$ |
| (c) $\frac{\text{Overall efficiency}}{\text{Volumetric efficiency}}$ | (d) $\frac{\text{Hydraulic efficiency}}{\text{Volumetric efficiency}}$ |
8. Pelton wheel is well suited for operating under
- | | |
|------------------|-------------------|
| (a) Low heads | (b) High heads |
| (c) Normal heads | (d) None of these |
9. The differences between the power obtained from the turbine shaft and the power supplied by water at its entry to the turbine is equal to
- | | |
|-----------------------------------|------------------------------------|
| (a) The hydraulic losses | (b) Mechanical losses |
| (c) Hydraulic & Mechanical losses | (d) Mechanical & Volumetric losses |
10. It is necessary that before the pump is started, its casing together with impeller and the Suction pipe must be filled with water in order to remove the air, gas or vapour in that region. This process is called
- | | |
|-------------|-------------|
| (a) Sucking | (b) Priming |
| (c) Drawing | (d) Pumping |
11. Centrifugal pump has the advantage over reciprocating pump
- | | |
|-------------------------|------------------------|
| (a) Smooth and evenflow | (b) Heavier in weight |
| (c) Low speed | (d) Torque not uniform |
12. The speed of a turbine in which the maximum speed is attained by the runner under maximum head at full gate opening, when the external load (i.e. generator) is disconnected from the system and the governor ceased to function is called
- | | |
|-------------------|----------------------|
| (a) Maximum speed | (b) Maximum velocity |
| (c) Runaway speed | (d) Variable speed |
13. To avoid cavitation the turbine runners are made of cast steel and coated with
- | | |
|---------------------|---------------|
| (a) Tungsten | (b) Cast iron |
| (c) Stainless steel | (d) Chromium |
14. In a centrifugal pump the sum of the suction head and delivery head is called
- | | |
|--------------------|---------------------|
| (a) Gross Head | (b) Static Head |
| (c) Effective Head | (d) Manometric Head |
15. In order to have a high efficiency, the centrifugal pumps are generally provided with impeller having their blades bent
- | | |
|--------------|------------------|
| (a) Inwards | (b) Backwards |
| (c) Forwards | (d) All of these |
16. As it discharges a definite quantity of fluid during the displacement of its position or plunger, a reciprocating pump is also known as a
- | | |
|--------------------------------|----------------------|
| (a) Positive displacement pump | (b) Centrifugal pump |
| (c) Rotary pump | (d) None of these |
17. When actual discharge of a reciprocating pump is more than theoretical discharge, the difference between theoretical discharge and actual discharge is known as
- | | |
|--------------------------|------------------------|
| (a) Slip of the pump | (b) Slip of the piston |
| (c) Slip of the cylinder | (d) Slip of the fluid |

18. A centrifugal fan forms
- (a) Closed system
 - (b) Open system
 - (c) Isolated system
 - (d) Circuited system
19. Zeroth law of thermodynamics defines
- (a) Internal energy
 - (b) External energy
 - (c) Temperature
 - (d) Pressure
20. The specific heat of a gas at constant pressure and a constant volume is
- (a) Always constant
 - (b) Always varies with pressure
 - (c) Always varies with temperature
 - (d) Always constant with temperature
21. Joule's statement establishes that (when expressed in the same units) during a cycle
- (a) Heat transfer is equal to work transfer
 - (b) Work transfer is only a fraction of the heat transfer
 - (c) Heat transfer is only a fraction of work transfer
 - (d) There is no relationship between work transfer and heat transfer
22. Who said this "It is impossible for the heat energy to flow spontaneously from a body at lower temperature to a body at higher temperature".
- (a) R.Clausius
 - (b) Kelvin Planck
 - (c) Carnot
 - (d) Pluto
23. The heat transfer is constant when
- (a) Temperature remain constant with time
 - (b) Temperature increases with time
 - (c) Temperature decrease with time
 - (d) Pressure varies
24. Heat transfer from higher temperature to lower temperature takes place
- (a) According to First law of thermodynamics
 - (b) According to Second law of thermodynamics
 - (c) According to Zeroth law of thermodynamics
 - (d) According to Fourier law
25. Thermal conductivity of water
- (a) First increase with temperature then decrease with temperature
 - (b) Increases steadily with temperature
 - (c) Decreases with temperature
 - (d) Does not depend on temperature
26. Mechanical efficiency of reciprocating air compressor is expressed as
- (a) BHP/IHP
 - (b) IHP/BHP
 - (c) FHP/BHP
 - (d) FHP/IHP
27. The fitting to extinguish boiler furnace fire in case of water level failing below safe level is
- (a) Feed check valve
 - (b) Below off cock
 - (c) Safety valve
 - (d) Fusible plug
28. Factors influencing boiler efficiency are
- (a) Fixed factors
 - (b) Variable factors
 - (c) Steam factors
 - (d) Both (a) & (b)

29. In jet type steam condensers
- (a) Steam and cooling water mix
 - (b) Steam and cooling water do not mix
 - (c) Steam passes through tubes and cooling water surrounds them
 - (d) Cooling water passes through tubes and steam surrounds them
30. In a steam engine fitted with condenser
- (a) The release pressure in engine is equal to condenser pressure
 - (b) The release pressure in engine is more than condenser pressure
 - (c) The release pressure in engine is less than condenser pressure
 - (d) The release pressure in engine is more than sufficient
31. In Rankine Cycle the work output from turbine is given by
- (a) Change of internal energy between inlet & outlet
 - (b) Change of enthalpy between inlet & outlet
 - (c) Change of entropy between inlet & outlet
 - (d) Change of temperature between inlet & outlet
32. The pressure on the two sides of the impulse wheel of a steam turbine
- (a) Same
 - (b) Different
 - (c) Decreases from one side to the other side
 - (d) Increases from one side to the other side
33. Internal combustion engine includes
- (a) Diesel engine
 - (b) Petrol engine
 - (c) Gas engine
 - (d) All of these
34. The type of fuel used in heavy commercial vehicle is
- (a) Petrol
 - (b) Gas
 - (c) Battery
 - (d) Diesel
35. In a four-stroke SI engine cycle, in the first stroke the piston travels from
- (a) TDC to BDC
 - (b) BDC to TDC
 - (c) Both (a) & (b)
 - (d) All of these
36. An engine in which the combustion process starts when the air-fuel mixture self-ignites due to high temperature in the combustion chamber caused by high compression is called
- (a) Spark ignition
 - (b) Compression ignition
 - (c) Direct injection
 - (d) Displacement
37. Position of the piston when it stops at the furthest point away from the cranksheft is
- (a) BDC
 - (b) TDC
 - (c) CI
 - (d) SI
38. Minimum volume in the combustion chamber with piston at TDC is called
- (a) Displacement
 - (b) Stroke
 - (c) Bore
 - (d) Clearance Volume
39. Rotating mass with a large moment of inertia connect to the crankshaft of the engine is called
- (a) Catalytic Converter
 - (b) Flywheel
 - (c) Exhaust manifold
 - (d) Fuel pump

40. Turbine compressor used to compress incoming air into the engine in CI engine is
(a) Super charger (b) Throttle
(c) Turbo charger (d) Starter
41. The hydrocarbons having the best anti-knock qualities are
(a) Paraffins (b) Olefins
(c) Napthalenes (d) Aromatics
42. An indication of ignition quality of a diesel engine is given by
(a) Detonation (b) Octane number
(c) Pre-ignition (d) Cetane number
43. The camshaft drive which does not require lubrication is
(a) Chain drive (b) Gear Drive
(c) Toothed rubber belt (d) Fan belt
44. Catalytic converters are called 3-way converters because they promote the reduction of
(a) CO, HC, NO_x (b) H₂O, O₂
(c) NO, C, H₂O (d) H, C, H₂O₂
45. The purpose of gear in an automobile is to
(a) Vary Speed
(b) Vary torque
(c) Provide constant speed
(d) Disconnect the road wheels from the engine when desired
46. The clutch is located between the transmission and the
(a) Engine (b) Rear engine
(c) Propeller shaft (d) Differential
47. Increase of torque in a vehicle is obtained by
(a) Decreasing speed (b) Decreasing power
(c) Decreasing fuel consumption (d) All of the above
48. The central portion of a propeller shaft is made from a
(a) Steel shaft (b) Gun metal shaft
(c) Steel tube (d) Cast iron rod
49. Another name for a damper is
(a) Shock absorber (b) Torsion bar
(c) Spring (d) Independent suspension
50. The purpose of tyre rotation on automobiles is to
(a) Avoid ply separation (b) Equalize wear
(c) Get better ride (d) None of these
51. Camshaft in an engine is always mounted
(a) Parallel to the crankshaft (b) Perpendicular to the crankshaft
(c) Inclined to the crankshaft (d) None of these
52. The engine requires overhauling in case of
(a) Poor compression (b) Excessive consumption of lubricating oil
(c) Mechanical failure (d) All of these

53. In vapour compression refrigeration system the heat is absorbed from the environments to be cooled by
(a) Evaporator (b) Condenser
(c) Compressor (d) Throttle valve
54. Heat is rejected by the refrigerant during vapour compression refrigeration cycle in
(a) Condenser (b) Evaporator
(c) Throttle Valve (d) Compressor
55. Co-efficient of Performance (COP) of domestic air conditioner as compared to that of domestic refrigerator will be
(a) Lower (b) Higher
(c) Same (d) Unpredictable
56. Requirement for refrigerants should be
(a) Non-poisonous (b) Non- explosive
(c) Non-corrosive (d) All of these
57. Ammonia is used with
(a) Reciprocating refrigerant compressors (b) Centrifugal refrigerant compressors
(c) Axial flow refrigerant compressors (d) All of these
58. Low boiling point refrigerant are preferably suited for
(a) Reciprocating compressors. (b) Large centrifugal pump
(c) Large axial flow rotary pump (d) All of these
59. In air conditioning system the term used for air entering through doors, windows and other openings is termed as
(a) Condensation (b) Infiltration
(c) Evaporation (d) Conduction
60. The temperature of saturation of air or the point beyond which any further cooling would result in condensation is called
(a) Absolute humidity (b) Wet-bulb temperature
(c) Absolute temperature (d) Dew point
61. The three types of cost estimation are- (i) Order of magnitude estimate (ii) Budget estimate and
(a) Forecasting estimate (b) Definitive estimate
(c) Product estimate (d) Both (a) & (b)
62. The materials directly contributed to a product and those easily identifiable in the finished product are called
(a) Direct product (b) Direct goods
(c) Direct materials (d) Direct cost materials
63. The four main components of costs are- (i)prime cost (ii) office cost (iii) total cost and
(a) Work Cost (b) Estimate cost
(c) Advanced cost (d) Material cost
64. Which one of the following is not a characteristics of management of engineering system?
(a) It should be innovative (b) It should be far sighted
(c) It should be rigid (d) It should not be too quick
65. Machining is a process designed to remove unwanted material from a workpiece in the form of
(a) Continuous chips (b) Discontinuous chips
(c) Granular (d) Both (a) & (b)

Directions (Questions 66 - 68) : Find the missing term in the following series:

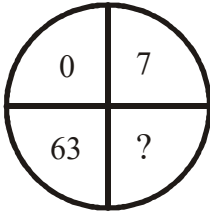
66. 2, 4, 8, 16, 32, _____, 128

- (a) 40
- (b) 64
- (c) 65
- (d) 81

67. 77, 7777, 777777, _____, 7777777777

- (a) 7777777
- (b) 77777777
- (c) 7777777777
- (d) 777777777777

68.



- (a) 15
- (b) 21
- (c) 26
- (d) 42

Directions (Question 69 - 70) : Complete the analogy:

69. See is to look, as hear is to _____

- (a) ears
- (b) noise
- (c) sense
- (d) listen

70. Carpenter is to chisel, as cobbler is to _____

- (a) Anvil
- (b) saw
- (c) axe
- (d) drill

71. Which comes next in the sequence?

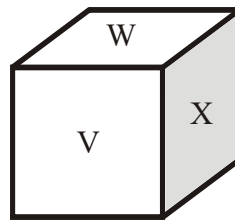
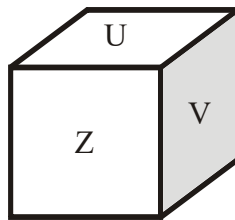
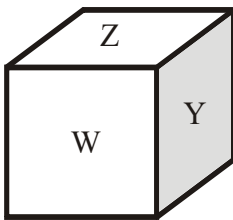


Answer Figures



- (a)
- (b)
- (c)
- (d)

72. Which letter is on the opposite face of X?



- (a) Z
- (b) W
- (c) Y
- (d) U

Directions (Questions 73 - 75) : *In the following questions, two statements are followed by two conclusions numbered I and II. Decide which of the given conclusions logically follows from the given two statements, disregarding commonly known facts:*

73. Statements

- I. All singers are smokers.
- II. Some smokers are drinkers

Conclusions

- I. All smokers are singers
- II. Some drinkers are not smokers

Give answer as

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If neither I nor II follows
- (d) If both I and II follows

74. Statements

- I. All stones are precious.
- II. Some precious are yellow.

Conclusions

- I. Some precious are stones.
- II. All yellow are precious.

Give answer as

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If neither I nor II follows
- (d) If both I and II follows

75. Statements

- I. Some scooters are pink.
- II. All pink are trains.

Conclusions

- I. Some scooters are trains
- II. No pink is a scooter

Give answer as

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If neither I nor II follows
- (d) If both I and II follows

* * * * *