

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 - II

Time Allowed : 2 hours

Full Marks : 150

Attempt all questions.

All questions carry equal marks of 2 each.

1. "The pressure exerted anywhere in a mass of confined liquid is transmitted undiminished in all directions throughout the mass so as to act with equal force on every unit area of the containing vessel in a direction at right angles to the surface of the vessel exposed to the liquid" is
 - (a) Darcy's Law
 - (b) Reynold's number
 - (c) Pascal's Law
 - (d) None of these
2. "A body, immersed partly or wholly in a fluid at rest, appears to lose a part of its weight, the apparent loss being equal to the weight of the fluid displaced" is
 - (a) Archimedes' Principle
 - (b) Pascal's Law
 - (c) Newton's Law of Motion
 - (d) None of these
3. The resultant upward thrust experienced by a body when immersed in the fluid is known as
 - (a) Equilibrium of floating bodies
 - (b) Buoyancy
 - (c) Weight of a body
 - (d) None of these
4. The base of 1m high column of water will have a pressure of
 - (a) Zero Kg/cm²
 - (b) 0.1 Kg/cm²
 - (c) 1.0 Kg/cm²
 - (d) 10 Kg/cm²
5. For calculating head lost due to water flow in the pipe, the general formula (Darcy & Weisbacks formulae) used is
 - (a) $h = \frac{4fLv^2}{2gd}$
 - (b) $h = \frac{14fLv^2}{2gd}$
 - (c) $h = \frac{fv^2}{2gd}$
 - (d) None of these
6. The mechanical device or arrangement by which water is caused to flow at increased pressure (higher level) is known as
 - (a) Electric Motor
 - (b) A pump
 - (c) Blower
 - (d) None of these
7. In a centrifugal pump installation, while starting the position of delivery valve is
 - (a) Fully closed
 - (b) Fully open
 - (c) Half open
 - (d) More than half open

8. Air vessel in a reciprocating pump are fitted to
- (a) Increase delivery head
 - (b) Reduce suction head
 - (c) Smoothen delivery head
 - (d) Reduce acceleration head
9. Which type of turbine is different from the others?
- a) Pelton turbine
 - (b) Propeller turbine
 - (c) Kaplan turbine
 - (d) Francis turbine
10. A type of pump, where a nozzle is placed at the throat of a venturi tube and it discharges either compressed air or steam or water at high velocity. The jet causes suction and water is drawn from suction pipe. The high velocity of mixture is converted into pressure head and the water is raised in the discharge pipe, is known as
- (a) Hydraulic ram
 - (b) Jet Pump
 - (c) Rotary Pump
 - (d) None of these
11. A rotodynamic pump, which does not generate centrifugal force for building up pressure, but pressure is generated by flow of liquids over the blades of aerofoil section just like the lifting action of the wings of an aeroplane, is known as
- (a) Axial flow pump
 - (b) Centrifugal pump
 - (c) Vertical Turbine pump
 - (d) None of these
12. "The law of conservation of energy, according to which the total energy of an isolated system in all its forms remains constant. For a closed system executing a cycle only through heat and work, the change in internal energy is zero", known as
- (a) Second Law of Thermodynamics
 - (b) Newton's First Law of Motion
 - (c) First Law of Thermodynamics
 - (d) None of these
13. A closed vessel made of high quality steel in which steam is generated from water by the application of heat, is known as
- (a) Steam nozzle
 - (b) Steam Generator (or) a boiler
 - (c) Steam Jet Draught
 - (d) None of these
14. A property used to measure the quality of energy or irreversibility of the process is called
- (a) Entropy
 - (b) Endurance limit
 - (c) Embossing
 - (d) None of these
15. "It is impossible to construct an engine to work in a cyclic process whose sole effect is to convert all the heat supplied to it into an equivalent amount of work" is
- (a) 2nd Law of Thermodynamics : Kelvin - Planck Statement
 - (b) 1st Law of Thermodynamics
 - (c) 2nd Law of Thermodynamics : Clausius Statement
 - (d) None of these
16. A process, which can be reversed bringing both the state of the system and the surroundings to the initial condition without any other inputs is
- (a) Irreversible process
 - (b) Reversible process
 - (c) Constant process
 - (d) None of these
17. A process, which can be reversed, cannot lead to the initial state of the system and the surroundings without external inputs, is
- (a) Irreversible process
 - (b) Reversible process
 - (c) Constant process
 - (d) None of these

18. A closed vessel heat exchanger in which steam coming from turbine is condensed using a supply of cooling water at atmospheric pressure.
- (a) Steam Engine (b) Heat Exchanger
(c) Condenser (d) None of these
19. The coal is reduced to a fine powder with the help of grinding mill and then projected into the combustion chamber with the help of hot air current is known as
- (a) Pulverized fuel firing (b) Manual fuel firing
(c) Non-Pulverized fuel firing (d) None of these
20. Which one is not the type of gas turbine?
- (a) Constant volume type
(b) Constant pressure type
(c) Compression Ignition Engine type
21. Which one is not any types of gas turbine cycles?
- (a) Otto cycle (b) Open cycle
(c) Closed cycle
22. Which one is not included in one of advantages of gas turbine?
- (a) Braking is not effective due to very high speed
(b) Gas turbine is smooth in operation and continuous in performance
(c) It does not have reciprocating parts, hence it is easy to balance. It is free from vibration.
23. Which one is not the part of gas turbine?
- (a) Compressor (b) Regenerator
(c) Combustion Chamber (d) Piston
24. A prime mover in which gradual changes in the momentum of a fluid are utilised to produce rotation of the mobile member is
- (a) Electric Motor (b) Turbine
(c) Diesel Engine (d) None of these
25. The unit of power is
- (a) Pound (b) Km
(c) N - m/s (d) Kg
26. The indicated power is the power of an engine developed -
- (a) on its piston (b) on its wheel
(c) on its crankshaft (d) in its cylinder
27. The type of engine used in most car is -
- (a) External Combustion (b) Diesel
(c) Compression Ignition (d) Internal Combustion
28. A single cylinder, 4 - stroke engine is rotating at 1000 rpm. The number of power strokes occurring in one minute is
- (a) 500 (b) 1000
(c) 1500 (d) 2000
29. The type of engine used in heavy commercial vehicle is
- (a) External Combustion (b) Petrol
(c) Diesel (d) Spark Ignition

30. A two-stroke engine is generally preferred to a four-stroke engine because -
- (a) It can be easily started
 - (b) Its size is smaller
 - (c) Its fuel composition is low
 - (d) Shocks and Vibrations are less
31. Mixing of fuel and air in case of a diesel engine occurs in
- (a) Inlet manifold
 - (b) Injector
 - (c) Engine Cylinder
 - (d) Inlet Valve
32. An engine has a clearance volume of 100cm^3 and swept volume of 800cm^3 . The compression ratio is
- (a) 7:1
 - (b) 9:1
 - (c) 10:1
 - (d) 8:1
33. A four-cylinder engine has a capacity of 2.4 litres. The swept volume of one cylinder is
- (a) 2400 cm^3
 - (b) 600 cm^3
 - (c) 1200 cm^3
 - (d) 400 cm^3
34. In a four-stroke engine, each cylinder has
- (a) One valve
 - (b) Two valves
 - (c) Three valves
 - (d) Four valves
35. The firing order in case of four cylinder in-line engine is usually
- (a) 1 - 2 - 4 - 3
 - (b) 1 - 3 - 4 - 2
 - (c) 1 - 4 - 3 - 2
 - (d) Either (b) or (c)
36. In internal combustion engine the approximate percentage of the combustion heat that passes to the cylinder walls is
- (a) 5%
 - (b) 10%
 - (c) 30%
 - (d) 60% or 75%
37. At the first sight a petrol engine is identified by
- (a) Cylinder size
 - (b) Power output
 - (c) Operating speed
 - (d) Spark plug
38. Which part is not common between the SI engine and CI engines?
- (a) Fuel Injector
 - (b) Air Cleaner
 - (c) Battery
 - (d) Exhaust Silencer
39. The octane rating of petrol commercially available is usually
- (a) 85 - 90
 - (b) 90 - 100
 - (c) 100 - 110
 - (d) 110 - 125
40. Cetane number of Diesel oil normally available in market is in the range
- (a) 45 - 50
 - (b) 60 - 65
 - (c) 75 - 80
 - (d) 90 - 100
41. In a Diesel Engine the duration between the time of injection and time of ignition is called
- (a) Spill cut off
 - (b) Delay period
 - (c) Period of injection
 - (d) Period of ignition
42. IC engine includes
- (a) Diesel engine
 - (b) Petrol engine
 - (c) Spark Ignition engine
 - (d) Any of these

43. A dirty exhaust and intense diesel knock from a C.I. engine is caused by
- (a) High Cylinder temperature
 - (b) Poor fuel atomization
 - (c) Supplying insufficient fuel to suit the air
 - (d) Breaking up the injected fuel into very fine particles
44. Petrol engine works on
- (a) Diesel cycle
 - (b) Dual cycle
 - (c) Otto cycle
 - (d) None of these
45. Wheel base of a vehicle is the
- (a) Distance between front & rear axles
 - (b) Distance between the front tyres
 - (c) Extreme length of the vehicle
 - (d) The combined width of rear tyres
46. Brake lining is mounted on
- (a) Brake shoe
 - (b) Brake drum
 - (c) Master Cylinder
 - (d) Wheel Cylinder
47. Radiator tubes are generally made of
- (a) Steel
 - (b) Brass
 - (c) Cast iron
 - (d) Plastics
48. Automobile gears are generally made of
- (a) Brass
 - (b) Alloy steel
 - (c) Stainless steel
 - (d) Mild steel
49. The principle of a radiator of an engine cooling system is to
- (a) Act as a reservoir for the water
 - (b) Cause heat flow by convection currents
 - (c) Spread out the hot water over a large area
 - (d) Increase the air speed as it flows over the hot surface
50. One effect of a punctured carburettor float is
- (a) Weak mixture
 - (b) Low petrol level
 - (c) High air fuel mixture
 - (d) Petrol flooding
51. As applied to steering, the abbreviation P.A.S. stands for
- (a) Pump assisted system
 - (b) Pump aided steering
 - (c) Power activated system
 - (d) Power assisted steering
52. Which one is not the method of cooling an I.C. engine?
- (a) Air cooling
 - (b) Oil cooling
 - (c) Water cooling
 - (d) Steam cooling
53. The artificial withdrawal of heat, producing in a substance or within a space, a temperature lower than that which would exist under the natural influence of surrounding is known as
- (a) Regeneration
 - (b) Refrigeration
 - (c) Reheating
 - (d) None of these
54. Control of temperature, humidity, purity and motion of air in an enclosed space, independent of outside conditions is known as
- (a) Air - conditioning
 - (b) Air - circulating
 - (c) Flow - controlling
 - (d) None of these

55. An electrically operated device used to keep houses, offices and laboratories cool during summer and warm during winter, which not only controls temperature but also regulates humidity is
- (a) Aircirculator (b) Airconditioner
(c) Air heater (d) None of these
56. One ton of refrigeration is
- (a) 211 KJ/min (b) 21 KJ/min
(c) 2 KJ/min (d) None of these
57. Which one is not included in major elements in Airconditioning?
- (a) Compressor (b) Condenser
(c) Evaporator (d) None of these
58. Refrigerant usually used in refrigeration in aeroplane
- (a) CO₂ (b) Air
(c) Freon (d) None of these
59. Formula for calculating horse power per ton of refrigeration
- (a) $\frac{4.75}{\text{COP}}$ (b) $\frac{475}{\text{COP}}$
(c) $\frac{47.5}{\text{COP}}$ (d) None of these
60. The amount (percentage) of water in the air is known as
- (a) Density (b) Specific gravity
(c) Humidity (d) None of these
61. Which one is not elements of cost?
- (a) Materials (b) Labour
(c) Expenses (d) None of these
62. Which one is not components of cost?
- (a) Prime cost (b) Factory cost & Office cost
(c) Total cost (d) None of these
63. Indirect Expenses is known as overhead charges, on-cost, burden or indirect charges. Which one is not included in classification of Indirect Expenses?
- (a) Factory expenses (b) Administration & Selling expenses
(c) Distribution expenses (d) None of these
64. What is the machining time to turn a M.S. bar of 3cm dia down to 2.5cm for a length of 10cm in a single cut. Assume cutting speed = 30m/min and feed = 0.4mm/rev.

Use the formulae : $N = \frac{100S}{\pi D}$

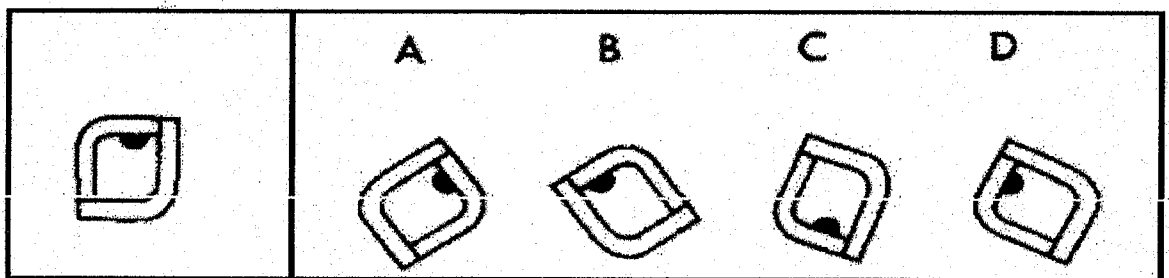
and $T = \frac{\text{Length}}{\text{Feed} / \text{rev.} \times \text{r.p.m}}$

- (a) 0.79 min (b) 7.9 min
(c) 0.079 min (d) None of these

65. The shop in which forging is done is known as Forging shop, which one is not included in type of forging?
(a) Hand forging (b) Machine forging
(c) None of these
66. To bake two muffins it takes $3\frac{1}{2}$ cups of sugar at about 11 paisa per cup. How much would it cost to purchase the sugar necessary to make 16 muffins?
(a) 2.42 (b) 3.60
(d) 2.92 (d) 3.08
67. The next number in the following sequence would be 3, 5, 8, 13, 21, 34, ____.
(a) 22 (b) 55
(c) 53 (d) 47
68. What does it mean to say "don't judge a book by its cover"?
(a) Don't believe everything you hear
(b) In judging a person or an object, do not look at outward appearance alone
(c) Well-bound books often have cheap covers
(d) Someone else's situation always seems better than our own
69. A substitute for "one who likes to spend time with others" in one word can be
(a) Introvert (b) Commoner
(c) Extrovert (d) Extraordinary
70. Mark the one alternative that is nearest in meaning to the word - Nullify
(a) Impress (b) No effect
(c) Seclude (d) Astound

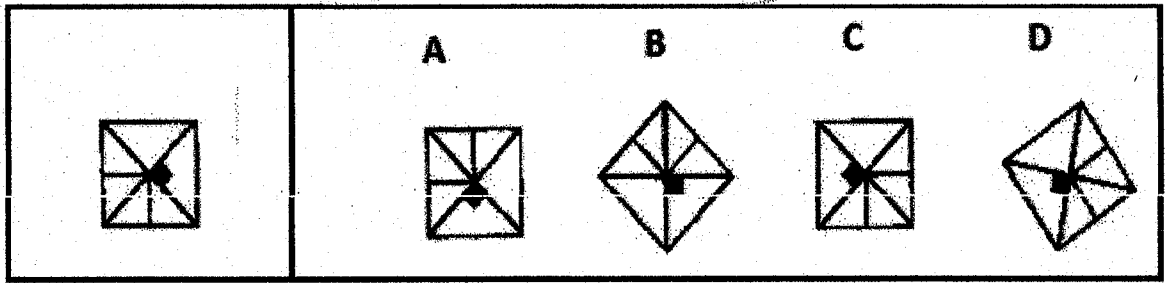
Directions (Questions 71 & 72): Each problem in this test consists of one figure on the left of a vertical line and four figures on the right. You are to decide which of the four figures on the right is the same as the figure on the left.

71.



- (a) A (b) B
(c) C (d) D

72.

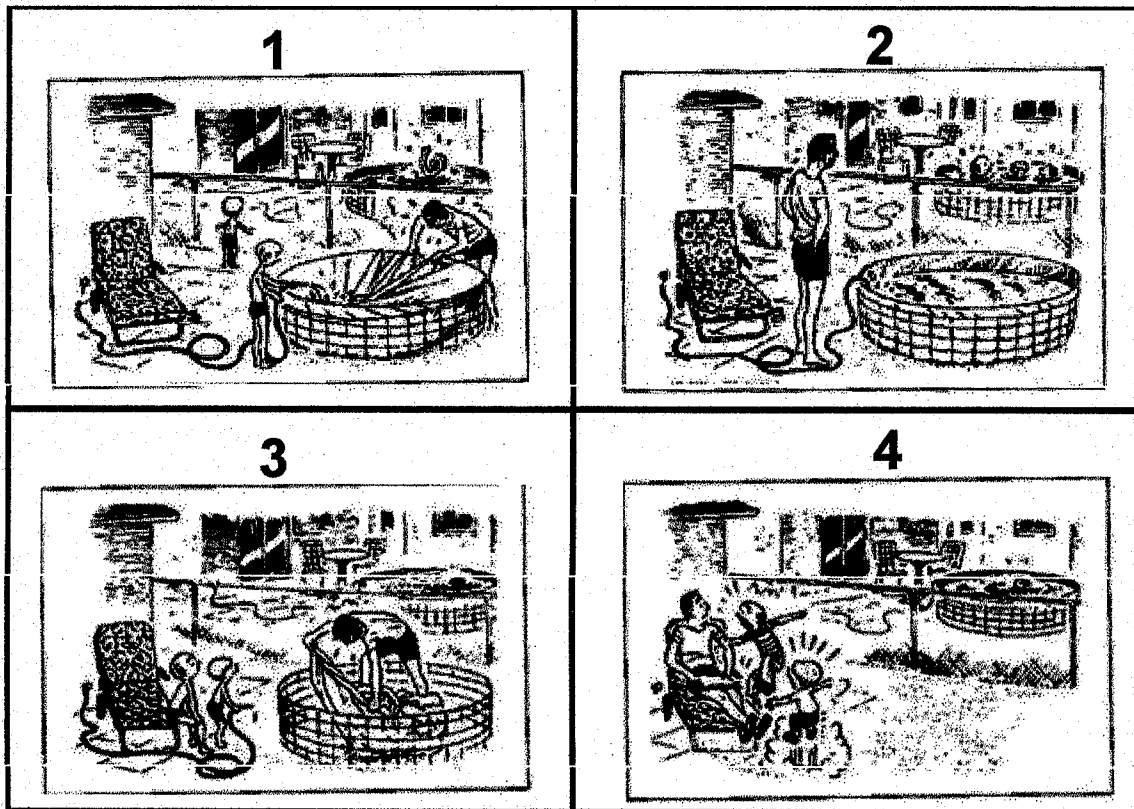


- (a) A
- (c) C

- (b) B
- (d) D

Directions (Question 73): Here are some pictures for you to arrange. They are mixed up and you are to put them in the right order so that they make the most sensible story. Choose the correct one of the following possible.

73.

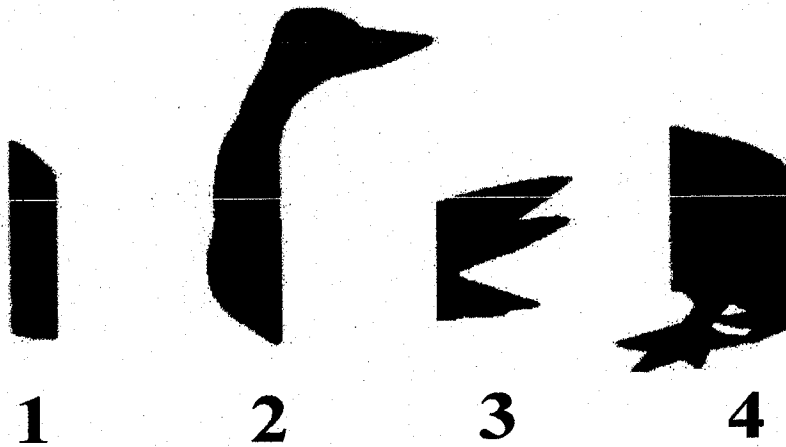


- (a) 1 4 3 2
- (c) 4 3 2 1

- (b) 4 1 2 3
- (d) 1 2 3 4

Directions (Questions 74 & 75): In this test, parts of well known objects are placed in the wrong order. You have to choose the correct order, from left to right, in which these parts should be placed in order to form the object. The parts of each object are numbered. Some possible ways of arranging these parts are given beside each object. Only one arrangement is correct.

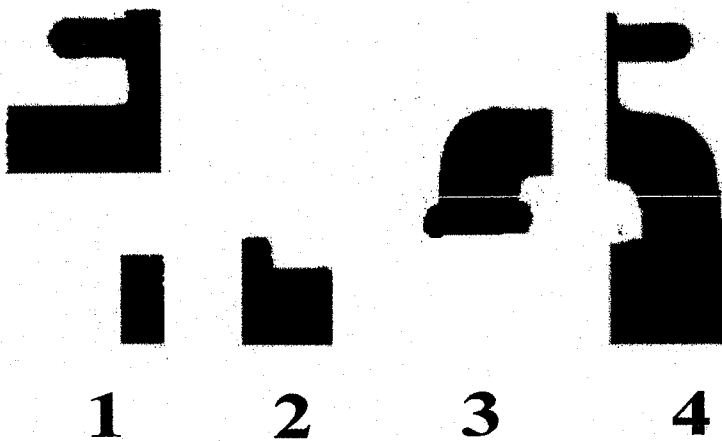
74.



- (a) 1 2 3 4
- (c) 2 1 4 3

- (b) 2 1 3 4
- (d) 1 4 3 2

75.



- (a) 3 1 4 2
- (c) 3 2 4 1

- (b) 3 4 1 2
- (d) 1 2 3 4
