

MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO JUNIOR ENGINEER (J.E) CONTRACT BASIS UNDER RURAL DEVELOPMENT DEPARTMENT, NOVEMBER 2016.

MECHANICAL ENGINEERING PAPER II

Time Allowed : 2 hours

Full Marks : 150

All questions carry equal marks of 2 each.

Attempt all questions

1. 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) $h = \frac{flv^2}{2gd}$

(d) None of these

2. 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

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. "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 Law of Motion

(d) None of these

5. "The pressure exerted any where 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) Dancy's Law

(b) Reynold's number

(c) Pascal's Law

(d) None of these

6. 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

7. 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
8. A pump consists of a piston or a plunger reciprocating inside a cylinder to increase the pressure of a liquid, which is a positive displacement pump is known as
- (a) Centrifugal Pump (b) Reciprocating Pump
(c) Air lift pump (d) None of these
9. A physical science concerned with the behaviour of fluids at rest and in motion is called
- (a) Pumping (b) Thermodynamics
(c) Fluid Mechanics (d) None of these
10. A device to raise liquids from a lower to a higher level by creating the required pressure with the help of centrifugal action is known as
- (a) Centrifugal Pump (b) Air lift pump
(c) Displacement Pump (d) None of these
11. 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
12. Petrol engine works on
- (a) Diesel cycle (b) Dual cycle
(c) None (d) Otto cycle
13. A dirty exhaust and intense diesel knock from a C.I. engine is caused by
- (a) High Cylinder temperature
(b) Poor Fuel Automization
(c) Supplying insufficient fuel to suit the air
(d) Breaking up the injected fuel into very fine particles
14. IC engine includes
- (a) Diesel Engine (b) Petrol Engine
(c) Spark Ignition Engine (d) Any of the above
15. 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
16. 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
17. The octane rating of petrol commercially available is usually
- (a) 85 - 90 (b) 90 - 100
(c) 100 - 110 (d) 110 - 125

18. Which part is not common between the SI engine and CI engines
- (a) Fuel Injector (b) Air Cleaner
(c) Battery (d) Exhaust Silencer
19. At the first sight a petrol engine is identified by
- (a) Cylinder size (b) Power output
(c) Operating speed (d) Spark plug
20. 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%
21. 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)
22. In a four - stroke engine, each cylinder has
- (a) One valve (b) Two valves
(c) Three valve (d) Four valves
23. A four-cylinder engine has a capacity of 2.4 litres. The swept volume of one cylinder is
- (a) 2400 cm³ (b) 600 cm³
(c) 1200 cm³ (d) 400 cm³
24. An engine has a clearance volume of 100cm³ and swept volume of 800cm³. The compression ratio is
- (a) 7 : 1 (b) 9 : 1
(c) 10 : 1 (d) 8 : 1
25. Mixing of fuel and air in case of a diesel engine occurs in
- (a) Inlet manifold (b) Injector
(c) Engine Cylinder (d) Inlet Valve
26. A two-stroke engine is generally preferred to a four-stroke engine because -
- (a) It can be easily started (b) Its size smaller
(c) Its fuel composition is low (d) Shocks and Vibrations are less
27. The type of engine used in heavy commercial vehicle is
- (a) External Combustion (b) Petrol
(c) Diesel (d) Spark Ignition
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 most car is -
- (a) External Combustion (b) Diesel
(c) Compression Ignition (d) Internal Combustion

30. 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
31. The unit power is
- (a) Pound
 - (b) Km
 - (c) N - m/s
 - (d) Kg
32. 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
33. Which one is not the part of gas turbine
- (a) Compressor
 - (b) Regenerator
 - (c) Combustion Chamber
 - (d) Piston
34. 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.
35. Which one is not any types of gas turbine cycles
- (a) Otto cycle
 - (b) Open cycle
 - (c) Closed cycle
36. Which one is not the type of gas turbine
- (a) Constant volume type
 - (b) Constant pressure type
 - (c) Compression Ignition Engine type
37. 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
38. 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
39. 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
40. 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

41. "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
42. 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
43. 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
44. "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
45. Which one is not the method of cooling an I.C. engine
- (a) Air cooling
 - (b) Oil cooling
 - (c) Water cooling
 - (d) Steam cooling
46. 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
47. One effect of a punctured carburettor float is
- (a) Weak mixture
 - (b) Low petrol level
 - (c) High air fuel mixture
 - (d) Petrol flooding
48. 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
49. Automobile gears are generally made of
- (a) Brass
 - (b) Alloy Steel
 - (c) Stainless Steel
 - (d) Mild Steel
50. Radiator tubes are generally made of
- (a) Steel
 - (b) Brass
 - (c) Cast Iron
 - (d) Plastics
51. Brake lining is mounted on
- (a) Brake shoe
 - (b) Brake drum
 - (c) Master Cylinder
 - (d) Wheel Cylinder

52. 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.
53. The amount (percentage) of water in the air is known as
- (a) Density
 - (b) Specific gravity
 - (c) Humidity
 - (d) None of these
54. Formula for calculating horse power per ton of refrigeration
- (a) $\frac{4.75}{COP}$
 - (b) $\frac{475}{COP}$
 - (c) $\frac{47.5}{COP}$
 - (d) None of these
55. Refrigerant usually used in refrigeration in aeroplane
- (a) CO_2
 - (b) Air
 - (c) Freon
 - (d) None of these
56. Which one is not included in major elements in Airconditioning
- (a) Compressor
 - (b) Condenser
 - (c) Evaporator
 - (d) None of these
57. One ton of refrigeration is
- (a) 211 KJ / min
 - (b) 21 KJ / min
 - (c) 2 KJ / min
 - (d) None of these
58. 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) Air circulator
 - (b) Air conditioner
 - (c) Air heater
 - (d) None of these
59. 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
60. 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
61. 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

62. 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 : $N = \frac{100S}{D}$ r.p.m.

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

- (a) 0.79 min (b) 7.9 min
(c) 0.079 min (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. Which one is not components of cost
- (a) Prime cost (b) Factory cost & Office cost
(c) Total cost (d) None of these
65. Which one is not elements of cost
- (a) Materials (b) Labour
(c) Expenses (d) None of these

Directions (Questions 66): Choose the correct alternative that will continue the same pattern and replace the question mark in the given series.

66. 120, 99, 80, 63, 48 ?
- (a) 35 (b) 38
(c) 39 (d) 40

67. Study the following table and answer the questions based on it.
Expenditures of a Company (in Lakh Rupees) per Annum Over the given Years.

Year	Item of Expenditure				
	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

- What is the average amount of interest per year which the company had to pay during this period?
- (a) Rs. 32.43 lakhs (b) Rs. 33.72 lakhs
(c) Rs. 34.18 lakhs (d) Rs. 36.66 lakhs

68. Arrange the words given below in a meaningful sequence.

- 1. Word
- 2. Paragraph
- 3. Sentence
- 4. Letters
- 5. Phrase

- (a) 4, 1, 5, 2, 3
- (b) 4, 1, 3, 5, 2
- (c) 4, 2, 5, 1, 3
- (d) 4, 1, 5, 3, 2

69. Arrange the words given below in a meaningful sequence.

- 1. Police
- 2. Punishment
- 3. Crime
- 4. Judge
- 5. Judgement

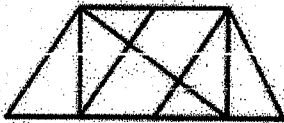
- (a) 3, 1, 2, 4, 5
- (b) 1, 2, 4, 3, 5
- (c) 5, 4, 3, 2, 1
- (d) 3, 1, 4, 5, 2

Directions (Questions 70): Pick out the most effective word(s) from the given words to fill in the blank to make the sentence meaningfully complete.

70. Catching the earlier train will give us the to do some shopping.

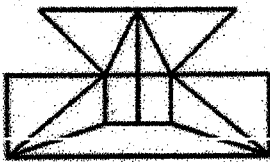
- (a) chance
- (b) luck
- (c) possibility
- (d) occasion

71. Find the number of triangles in the given figure.



- (a) 8
- (b) 10
- (c) 12
- (d) 14

72. Find the minimum number of straight lines required to make the given figure.



- (a) 16
- (b) 17
- (c) 18
- (d) 19

Directions (Questions 73): In each of the following questions, arrange the given words in a meaningful sequence and thus find the correct answer from alternatives.

73. Y is in the East of X which is in the North of Z. If P is in the South of Z, then in which direction of Y, is P?

- (a) North
- (b) South
- (c) South-East
- (d) None of these

Directions (Questions 74): Find the statement that must be true according to the given information.

74. Vincent has a paper route. Each morning, he delivers 37 newspapers to customers in his neighbourhood. It takes Vincent 50 minutes to deliver all the papers. If Vincent is sick or has other plans, his friend Thomas, who lives on the same street, will sometimes deliver the papers for him.
- (a) Vincent and Thomas live in the same neighbourhood.
 - (b) It takes Thomas more than 50 minutes to deliver the papers.
 - (c) It is dark outside when Vincent begins his deliveries.
 - (d) Thomas would like to have his own paper route.

Directions (Questions 75): Read the question carefully and choose the correct answer.

75. Four people witnessed a mugging. Each gave a different description of the mugger. Which description is probably right?
- (a) He was average height, thin, and middle-aged.
 - (b) He was tall, thin, and middle-aged.
 - (c) He was tall, thin, and young.
 - (d) He was tall, of average weight, and middle-aged.

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