Karnataka RTO

Previous Year Paper

Mechanical 2016

1. The process of isothermal transformation to form bainith in steels is known as _____

(1) Austempering
(2) Austeniting
(3) Powder Metallurgy
(4) Polymerization

2. Which of the following will have least percentage of carbon ?

(1) High ductility wires
(2) Connecting rods
(3) Dyes and punches
(4) Paper knives

3. The following materials is used for making permanent magnets.

(1) Triatinum cobalt
(2) Carbon steel
(3) Alnico v
(4) All the three

4. Tensile strength of grey cast iron may be of the order of _____

(1) 140 kg/cm^2
(2) 1400 kg/cm^2
(3) 14000 kg/cm^2
(4) 140000 kg/cm^2

5. Which of the following metals has face centred cubic structure ?

(1) Zinc
(2) Magnesium
(3) Cadmium
(4) Gold

6. Pearlite is a combination of _____

(1) 6.6% carbon and 93.33% iron
(2) 13% ferrite and 87% cementite
(3) 13% cementite and 87% ferrite
(4) 13% carbon and 87% ferrite

7. Comparators are generally sensitive to changes, of the order of _____

(1) 0.001mm or less
(2) 0.002mm or less
(3) 0.02mm or less
(4) None of these

8. A circular plate of 25cm diameter with both surface maintained at a uniform temperature of 100^0c is suspended horizontally in atmospheric air at 20^0c. Determine the heat transfer from the plate.

Properties of air at $T_f = 60^0$c from HMT data book
V = 18.97 x 10^{-6} m^2 / s, K = 0.02896 w/mk, Pr = 0.696

(1) 56.43 w
(2) 47.83 w
(3) 63.74 w
(4) 39.64 w

9. The radiation emitted by the red body is less than that of black body then the heat radiated become _____

(1) Q = ú ů T^4
(2) Q = ú ů T^3
(3) Q = ú ů T^2
(4) Q = ú ů T

Where ú = Emissivity of red body.

10. A person riding a bicycle turns the pedal at 40 rpm. Find the speed of the wheel, if the number of teeth in the driving sprocket is 50 & that in the driven sprocket is 25.

(1) 60 rpm
(2) 80 rpm
(3) 100 rpm
(4) 120 rpm

11. A closed ï coil helical spring is subjected to a torque about its axis. The spring wire would experience a _____

(1) Bending stress.
(2) Direct tensile stress of uniform intensity at is cross section.
(3) Direct shear stress.
(4) Torsional shearing stress.

12. The correct sequence of the given components of vapour compression refrigerator are _____

(1) Compressor, Condenser, Evaporator and throttle valve
(2) Throttle valve, Evaporator, Compressor and Condenser
(3) Condenser, Throttle valve, Evaporator and Compressor
(4) Evaporator, Compressor, Condenser and Throttle valve

13. Routing in production planning and control refers to the _____

(1) Balancing of load or machines
(2) Progress of work performed
(3) Authorisation of work to be performed
(4) Sequence of operations to be performed

14. Which one of the following action increase the knocking tendency in the S.I. Engine ?

(1) Increasing mixture strength beyond equivalence ratio (ø) = 1.4
(2) Retarding the spark and increasing the compression ratio.
(3) Increasing the compression ratio and reducing engine speed.
(4) Increasing both mixture strength beyond equivalence ratio (ø) = 1.4 and the compression ratio.

15. Anti friction bearings are _____

(1) Sleeve bearings
(2) Gas lubricated bearings
(3) Journal bearings
(4) Ball and roller bearings

16. In a leaf springs, the inner spring of leaf will usually form a crack first because _____

(1) The load is directly applied on this spring.
(2) The radius of curvature of inner leaf is more than that of outer one.
(3) The radius of curvature of outer leaf is more than that of inner one.
(4) All the leaves have different stresses.

17. There are two products A and B with the following characteristics:

Product	Demand	Order Cost (in Rs/order)	Holding Cost (in Rs/unit)
A	100	100	4
B	400	100	1

The economic order quantities (EOQ) of product A and B will be in the ratio of :

(1) 1 : 1
(2) 1 : 2
(3) 1 : 4
(4) 1 : 8

18. If the performance of diesel engines of different sizes, cylinder dimensions and power ratings are to be compared, which of the following parameters can be used for such comparison ?

(1) Swept volume
(2) Air fuel ratio
(3) Specific brake fuel consumption
(4) Volumetric efficiency

19. Property of a fluid by which its own molecules are attracted is called _____

(1) Adhesion
(2) Cohesion
(3) Surface torsion
(4) Viscosity

20. If the velocity distribution over the plate is given by $u = \frac{2}{3} y - y^2$. in which u is the velocity in meter per second at a distance y meter, above the plate. Determine the shear stress at y = 0. Take dynamic viscosity of fluid as 8.63 poise.

(1) 0.1026 N/m^2
(2) 0.5756 N/m^2
(3) 0.0021 N/m^2
(4) 0.4855 N/m^2

21. A block weighing 300 N in air was found to weigh 200 N when fully submerged in water. The specific gravity of the block is _____

(1) 1
(2) 2
(3) 3
(4) 4

22. The ratio of inertia force to viscous forces in the velocity boundary layer is known as _____

(1) Prandtl number
(2) Reynolds number
(3) Grashof number
(4) Nusselt number

23. The total heat transfer rate between the hot & cold fluids can also be calculated by using _____

(1) ¡ A æT m
(2) ¡ A^2 æT m
(3) ¡ ^{2} A^2 æT m
(4) None of the above

24. NTU is a dimensionless parameter, which is expressed as _____

(1) $\frac{¡^2 Cmin}{A}$
(2) $\frac{Cmin\ A}{¡^2}$
(3) $\frac{¡\ A}{Cmin}$
(4) None of the above

25. The process of carnot cycle are _____

(1) Two adiabatic and two constant volume.
(2) Two isothermal and two isentropics.
(3) Two constant volumes and two isothermals.
(4) One constant volume and one constant pressure and isentropics.

26. Specific volume of Super heated steam calculated using _____

(1) $V_g \frac{t_{sup}}{t_{sat}}$

(2) $V_g \frac{t_{sat}}{t_{sup}}$

(3) $\frac{t_{sup}}{t_{sat}}$

(4) None of these

27. The principle of refrigeration is based on _____

(1) I Law of thermodynamics
(2) II Law of thermodynamics
(3) Zeroth Law of thermodynamics
(4) Law of conservation of energy

28. Boiling point of Ammonia is _____

(1) ï 33.3^0 c
(2) ï 77.6^0 c
(3) ï 10^0 c
(4) ï 29.8^0 c

29. An example of a tangential flow turbine is _____

(1) Pelton wheel
(2) Francis turbine
(3) Kaplan turbine
(4) None of these

30. In a reaction turbine the pressure on the two sides of the moving blades _____

(1) remians same
(2) increases
(3) decreases
(4) none of the above

31. In which of the following heat exchange process, the value of overall heat transfer coefficient will be highest ?

(1) Steam to oil
(2) Steam condensers
(3) Air to heavy tars
(4) Air to CO_2

32. _____ has maximum value of thermal conductivity .

(1) Lead
(2) Copper
(3) Steel
(4) Aluminium

33. Which of the following bends will cause maximum head loss ?

(1) 30^0 bend
(2) 60^0 bend
(3) 90^0 bend
(4) U ï bend

34. If 'k' is the height of roughness projection and 'δ' is the thickness of laminar sub layer ; For a pipe surface to be hydraulically smooth, _____

(1) $\frac{k}{\delta} < 0.25$

(2) $0.25 < \frac{k}{\delta} < 0.5$

(3) $0.3 < \frac{k}{\delta} < 1.0$

(4) $1.0 < \frac{k}{\delta} < 1.5$

35. Inversion of single slider crank chain is found in _____

(1) Beam engine
(2) Bull engine
(3) Coupling rod of a locomotive
(4) Watt's indicator mechanism

36. The Grubler's criterion for determining the degree of freedom (n) of mechanism having plane motion, when l = number of links, j = number of joints.

(1) n = (l − 1) − j
(2) n = 2 (l − 1) − 2 j
(3) n = 3 (l − 1) − 2 j
(4) n = 4 (l − 1) − 3 j

37. If one of the walls moves in the direction of flow with uniform velocity while the other wall is stationary, then resulting flow between parallel walls is called _____

(1) Plug flow
(2) Stoke's flow
(3) Couette flow
(4) Euler's flow

38. Most accurate dynamometer is the _____

(1) Prony brake type
(2) Hydraulic type
(3) Swing field type
(4) Eddy current type

39. In grinding, artificial abrasive include _____

(1) Silicon carbide
(2) Corundum
(3) Sand Stone
(4) Diamond

40. In ultrasonic machining, the electrical energy is converted into mechanical vibration by _____

(1) Velocity transformer
(2) Piezo electronic effect
(3) Magnetostriction
(4) maskant

41. Machine vision doesnôt employ _____

(1) Segmentation
(2) Thresholding
(3) Shearing
(4) Feature extraction

42. Production flow analysis chart is also known as _____

(1) String diagram
(2) Part ï machine incidence diagram
(3) Polygraph
(4) Pie ï chart

43. The amount of cold work that a metal will stand is dependent upon _____

(1) Carbon Percentage
(2) Purity of metal
(3) Process
(4) Ductility

44. For a refrigerator and a heat pump working on a reversed carnot cycle between the same temperature limits, which of the following is correct ?

(1) COP of refrigerator = COP of heat pump
(2) COP of refrigerator = COP of heat pump + 1
(3) COP of refrigerator = COP of heat pump ï 1
(4) COP of refrigerator = inverse of COP of heat pump

45. Range of temperature measurement of a resistance thermometer is _____

(1) ï 50^0 F to 200^0 F
(2) ï 100^0 F to 400^0 F
(3) ï 200^0 F to 800^0 F
(4) ï 400^0 F to 1800^0 F

46. Sodium silicate in sand is often used as _____

(1) Substitute of clay
(2) Binder
(3) Refractory material
(4) Permeability promotion agent

47. A motor weighing 2000kg is to be lifted by wrought iron eye bolt, screwed into the frame. Choose single bolt out of the following.

(1) M 12 coarse thread
(2) M 30 coarse thread
(3) M 12 fine thread
(4) M 30 fine thread

48. The percentage of average inventory for an item is 20%. What is the amount of inventory cost for an EOQ of 5000 rupees ?

(1) 1000
(2) 2000
(3) 500
(4) 250

49. To obtain solution for a material handling problem so that the cost of handling will be minimum, one has to follow _____

(1) Simplex method
(2) Queuing theory
(3) Transportation method
(4) Value engineering

50. SIMO Charts used in _____

(1) Method study
(2) Micromotion study
(3) Process analysis
(4) Layout analysis

51. Which motion has magnitude of static frictional force directly proportional to normal reaction ?

(1) Actual motion
(2) Impending motion
(3) Both (1) and (2)
(4) None of the above

52. Which of the following statements is true for flat belts ?

(1) They are used for short distances between the pulleys
(2) They have high efficiency
(3) They are used in lathe machines
(4) All of the above

53. Which of the following statements is false about frame / truss ?

(1) Bent member is never used in a truss
(2) Internal hinges are used to connect members in a truss
(3) All members in the truss are two force members
(4) Multiforce members can be used in a frame

54. Which of the following conditions is satisfied for cantilever truss ?

(1) n > 2 j ï R
(2) n < 2 j ï R
(3) n = 2 j ï R
(4) n Í 2 j ï R

55. Which of the following is an elastic curve equation for shear force ?
(EI = flexural rigidity)

(1) S = EI (dy / dx)
(2) S = EI (d^2y / dx^2)
(3) S = EI (d^3y / dx^3)
(4) S = EI (d^4y / dx^4)

56. The maximum tangential stress $\mathring{u}_t = (\mathring{u}_x \sin 2đ) / 2$ is maximum if, đ is equal to _____

(1) 45^0
(2) 90^0
(3) 270^0
(4) All of the above

57. If brakes are applied on front wheels of a car and if it moves on a level road, then retardation of the car is calculated using the formula _____

(1) ε g
(2) [ε g (l ï x)] / (l + ε h)
(3) (ε g x) / (l - ε h)
(4) None of the above

58. In IC engine mechanism, which formula is used to calculate acceleration of the piston ?

(1) ω^2 r (cos ɑ + cos ɑ / n)
(2) ω^2 r (cos ɑ + cos 2ɑ / n)
(3) ω^2 r (cos ɑ - cos ɑ / n)
(4) ω^2 r (cos ɑ - cos 2ɑ / n)

59. For designing ductile materials, which of the following theories is / are used ?

(1) Maximum shear stress theory
(2) Shear strain energy theory
(3) Both (1) and (2)
(4) None of the above

60. Why are mechanical springs used ?

(1) To apply force
(2) To store energy
(3) To measure force
(4) All of the above

61. The velocity gradients over the boundary layer are _____

(1) Small
(2) Large
(3) Sometimes small and sometimes large
(4) Cannot say

62. What are thermoplastics ?

(1) They are nonlinear polymers, in which rise in temperature increases plasticity
(2) They are linear polymers, in which rise in temperature increases plasticity
(3) They are linear polymers, in which temperature rise has no effect on plasticity
(4) None of the above

63. The formation of scale boiler leads to _____

(1) Decrease in efficiency of boiler
(2) Increase in efficiency of boiler
(3) Increase in heat transfer
(4) Decrease in maintenance of boiler

64. At 100% relative humidity, the wet bulb temperature is _____

(1) Lower than the dew point temperature
(2) Higher than the dew point temperature
(3) Equal to the dew point temperature
(4) None of the above

65. Which among the following rubbers are used for automobile tyres ?

(1) Only Polyurethane rubbers
(2) Only Butadiene rubbers
(3) Both Polyurethane and Butadiene are used
(4) None of these

66. Select the correct option which shows mechanical property of ceramic materials ?

(1) Non-crystalline ceramics become brittle below recrystallization temperature
(2) At high temperatures ceramics have favourable properties
(3) Ceramic products are resistant to oxidation
(4) Ceramics can be used as a moderator

67. The volume of metal that enters the rolling stand _____

(1) Should increase after rolling process
(2) Should decrease after rolling process
(3) Should remain same after rolling process
(4) Unpredictable

68. Which among the following is a type of clearance fit ?

(1) Force fit
(2) Push fit
(3) Slide fit
(4) Tight fit

69. Angular speed of a seconds hand of a clock is _____

(1) ´ rad / sec
(2) ´ / 6 rad / sec
(3) ´ / 15 rad / sec
(4) ´ / 30 rad / sec

70. The number of strain guages needed on a plane surface to determine the principal strains & their directions is _____

(1) 1
(2) 2
(3) 3
(4) 4

71. The shear stress distribution over a rectangular cross ï section of a beam follows:

(1) A straight line path
(2) A circular path
(3) A parabolic path
(4) None of these

72. Watt's indicator mechanism is an inversion of _____

(1) Four bar chain
(2) Single slider crank chain
(3) Double slider crank chain
(4) Crossed slider crank chain

73. A bicycle remains stable in running through a bend because of _____

(1) Gyroscopic action
(2) Coriolis acceleration
(3) Centrifugal action
(4) None of the above

74. For critical damping, damping factor (Z) will be _____

(1) Z = 1
(2) Z > 1
(3) Z < 1
(4) None of the above

75. Critical speed is the speed at which the shaft tends to vibrate violently in _____

(1) Linear direction
(2) Transverse direction
(3) Longitudinal direction
(4) Unknown direction

76. A simple spring ï mass vibrating system has a natural frequency of N. If the spring stiffness is halved & the mass is doubled, then the natural frequency will be _____

(1) $\frac{N}{2}$
(2) 2 N
(3) 3 N
(4) 4 N

77. Maximum principles stress failure theory was given by _____

(1) St. Venant
(2) Haigh
(3) Rankine
(4) Guest coulombôs & Tresca

78. A one dimensional flow is one which _____

(1) Is uniform
(2) Is steady uniform
(3) Takes place in straight lines
(4) Involves zero transverse components of flow

79. Rain drops are spherical because of _____

(1) Viscosity
(2) Air Resistance
(3) Surface Tension
(4) Atmospheric pressure

80. Heat transfer takes place according to _____

(1) Zeroth law of thermodynamics
(2) First Law of thermodynamics
(3) Second Law of Thermodynamics
(4) Third Law of Thermodynamics

81. Critical thickness of insulation is given by _____

(1) $\frac{k}{h}$
(2) $\frac{h}{2k}$
(3) $\frac{2k}{h}$
(4) $\frac{k}{4' h}$

82. A gas which obeys kinetic theory perfectly is _____

(1) Pure gas
(2) Real gas
(3) Perfect gas
(4) All of the above

83. A gas turbine cycle with heat exchanger & reheating improves _____

(1) Only the thermal efficiency
(2) Only the specific power output
(3) Both (1) and (2)
(4) None of the above

84. Air standard efficiency of an I.C. engine depends on _____

(1) Speed
(2) Compression ratio
(3) Fuel
(4) All of the above

85. For the same compression ratio the efficiency of diesel cycle as compared to otto cycle is _____

(1) Less
(2) More
(3) Equal
(4) None of the above

86. In a refrigeration cycle, the moisture is to be removed before it enters the _____

(1) Evaporator
(2) Compressor
(3) Condenser
(4) Expansion device

87. Investment casting uses pattern made of _____

(1) Wax
(2) Clay
(3) Metal
(4) Wood

88. Sheet moulding process requires _____

(1) Wooden patterns
(2) Sand patterns
(3) Plastic patterns
(4) Metal patterns

89. What are the components of a typical NC system ?

(1) Tape Input
(2) Machine tool
(3) Controller
(4) All of the above

90. Two of the major processing languages are PROLOG and _____

(1) LISP
(2) COBOL
(3) PASCAL
(4) BASIC

91. Forecasting which assumes a static environment in the future is _____

(1) Passive forecasting
(2) Active forecasting
(3) Long term forecasting
(4) Short term forecasting

92. Chart which is useful for scheduling & control is _____

(1) Kanban
(2) Gantt chart
(3) Flow process chart
(4) X and R chart

93. Short processing time sequencing of jobs in a single facility would minimise the _____

(1) Mean lateness
(2) Mean tradiness
(3) Minimum tradiness
(4) Maximum tradiness

94. Philosophy of JUST IN TIMES manufacting is _____

(1) Set ï up cost should be reduced
(2) The goal should be zero inventory
(3) Productivity & Quality inseparable
(4) All of the above

95. The simplex method is the basic method for _____

(1) Value analysis
(2) Linear programming
(3) Model analysis
(4) Operation research

96. CPM is _____

(1) Time oriented technique
(2) Event oriented technique
(3) Activity oriented technique
(4) Work oriented technique

97. The octane rating of petrol commercially available is usually _____

(1) 85 ï 90
(2) 90 ï 100
(3) 100 ï 105
(4) 105 ï 110

98. One working stroke for each revolution of the crankshaft is in _____

(1) Two stroke engine
(2) Four stroke engine
(3) Six stroke engine
(4) All of the above

99. Fuel injector is used in _____

(1) Diesel engine
(2) Spark ignition engine
(3) Gasoline engine
(4) Petrol engine

100.How many types of diesel smoke are there ?

(1) One
(2) Two
(3) Three
(4) Four