1. **In material handling "Principle of unit load" means:**
   1) Instead or moving the small parts one by one, move it by group
   2) Measure the weight of parts
   3) Move / transport the materials carefully
   4) Move one by one with hand

2. **ABC Analysis indicates :**
   1) Cost 70% C - items 10% Qty Cost 20% B - items 20% Qty Cost 10% A - items 70% Qty
   2) 1) Moderate Item, 2) Essential, Item, 3) Desirable items
   3) X, Y, Z - Items
   4) F, N, S, D - Items

3. **Method study is concerned with :**
   1) Finding the best technique to do the job
   2) Finding the best way of doing the job
   3) Increase the time
   4) Finding the time required to complete the job

4. **Work study is a generic term for -**
   1) Method study and part study
   2) Work measurement and time study
   3) Method study and work measurement
   4) Time study and activity study

5. **The shape of the nozzle for Mach number greater than one is:**
   1) Cylindrical
   2) Uniform
   3) Divergent
   4) Convergent

6. **The most popular firing order of four stroke I.C. engine is :**
   1) 1 - 3 - 2 - 4
   2) 1 - 4 - 2 - 3
   3) 1 - 4 - 3 - 2
   4) 1 - 2 - 3 - 4

7. **The top piston ring bearer to piston crown is :**
   1) Scrapper ring
   2) Oil ring
   3) Groove ring
   4) Compression ring

8. **In CI engines, the exhaust valve opens -**
   1) 30° to 50° in advance of BDC
   2) 10° to 50° after TDC
   3) 10° to 25° in advance of TDC
   4) 25° to 50° after BDC

9. **The ratio of air rotational speed to crankshaft rotational speed is :**
   1) Swirl Ratio
   2) Speed ratio
   3) Turbulence Ratio
   4) Compression ration

10. **Accumulation of carbon deposits on the cylinder head of an IC Engine leads to increase in -**
    1) Piston development
    2) Clearance Volume
    3) Swept volume
    4) Compression ratio

11. **Very high compression ratios are not used with petrol engines because :**
    1) Self ignition would take place before the spark occurs
    2) Power required for compression ratio very high
    3) Lower thermal efficiency
    4) Cylinder walls are to be made thicker

12. What does the symbol  describe?

A.	Operation cum inspection
B.	Transportation and inspection
C.	Operation cum transportation
D.	Delay and storage

13. **In graphical method, "The Feasible Region" is :**
1) The area which is not giving the answer
2) The area which will give wrong answer
3) The area which satisfies all the constraints
4) The area which does not satisfy the constraints

14. **Standard Time of Job is :**
1) Observed time
2) Observed time + Normal time
3) Observed time + Performance Rating factor + Allowances
4) Observed time + policy allowances

15. **Staffing is defined as :**
1) Workers working in an organization
2) Work done by an employee
3) Filling , and keeping filled positions in organization structure
4) The art of getting things done by/with people

16. **Decision making is defined as :**

1) Selecting missions and objectives and the actions to achieve them
2) Selection of a course of action from among several alternatives
3) Identify the basic functions of an organization
4) Sequence of action , rather than to thinking

17. **Why Frederick Taylor has been called "The father of scientific management" ?**
1) He did Hawthorne study
2) He suggested a comprehensive social system
3) His primary concern was to increase productivity through application of scientific method
4) He divides industrial activities into six groups

18. **The compression ratio for a diesel engine lies in the range -**
1) 10 - 15
2) 16 - 22
3) 3 - 5
4) 6 - 8

19. **Stoichiometric Air-fuel ratio for IC Engine fuels is about -**
1) 20
2) 10.5
3) 14.5
4) 11

20. **A turbo charger in a diesel engine is for -**
1) Fuel economy
2) Avoiding knock
3) Increased efficiency
4) Increased power output for a given size of the engine

21. **Transducer can give different output from the same value of quantity being measured according to whether that value has been reached by a continuously increasing or decreasing change. The effect is known as :**

1) Static Error
2) Dynamic Error
3) Hysteresis Error
4) Repeatability Error

22. **When a beam of charged particles passes through a magnetic field, forces act on the particles and the beam is deflected from its straight line path . This is known as :**

1) Hall effect
2) Peliter effect
3) Archimedes
4) Faraday's law

23. **Intrapreneur Means.**

1) Employer, who can take risk
2) Employee, who can't take risk, but do all other activities of employer
3) Business owner
4) Employer's relative

24. **What determines the span of management and hence the level of organization ?**

1) Number of managers in the organization
2) Number of persons a manager can supervise effectively
3) Qualification of manager
4) It is determined by employer

25. **What is the first step in basic control process ?**

1) Correcting variations
2) Establishing standards
3) Performance measures
4) Decision making

26. **Limitations of 'MBO' [Management by objectives"] is :**

1) MBO leads to better understandins between employer and employer
2) If allows greater consistency in decision making
3) MBO keeps company objectives constantly in view
4) Management working by objectives may follow too rigid a pattern in thinking and action

27. **Without objectives and plans, control is not possible, because.**

1) Performance has to be measured against cost
2) Performance has to be measured against time
3) Performance has to be measured against some established criteria
4) Performance has to be measured against person

28.

Which one of the following control chart is applicable for variables?	
A.	C - chart
B.	np - chart
C.	$\bar{X}$ -R - chart
D.	p chart

29. **Which one of the following is not a chance cause of variation?**
1) Variation in raw material
2) Faulty setup
3) Small vibration of a machine
4) Lack of perfection in reading instruments.

30. **The time taken which elapses after the input to a system or element is abruptly increased from zero to a constant value up to the point at which the system or element gives an output corresponding to some specified % is known as :**
1) Rise time
2) Setting time
3) Response Time
4) Mean Time

31. **The function of a moderator in a nuclear reactor is :**
1) To slow down the fast moving neutrons
2) To speed up the slow moving neutrons
3) To start the chain reaction
4) To heat the water

32. **Water hammer is developed in -**
1) Penstock
2) Draft tube
3) Turbine
4) Surge tank

33. **In a steam condenser, the partial pressure of steam and air are 0.06 bar and 0.007 bar respectively. The condenser pressure is :**
1) 0.067 bar
2) 0.06 bar
3) 0.053 bar
4) 0.007 bar

34. **Economiser is used to heat -**
1) Air
2) Feed waser
3) Flue gases
4) Coal

35. **Which of the following coals has the highest calorific value ?**
1) Peat
2) Lignite
3) Bituminous
4) Anthracite coal

36. **Control rods used in a nuclear reactor are made up of -**
1) Steel
2) Cadmium
3) Copper
4) Bronze

37. **The temperature above which a material loses its ferroelectric properties is:**
1) Ferro temperature
2) Insulating temperature
3) Curie temperature
4) Critical temperature

38. **Ionization gauges are used to measure -**
1) Higher pressures
2) Lower pressures
3) Sound
4) Stress

39. **Which one of the following is not a Data presentation method ?**
1) Bar diagram
2) Histogram
3) Pie chart
4) Sampling scheme

40. **Np-chart and P-chart differs in -**
1) Sample size
2) Sampling techniques
3) Number of samples
4) Number or defects

41. **How the lack of control is indicated on control charts ?**

1) No points are outside control limits
2) The number of points above and below the centre line is about the same
3) A run of more than 8 points on the same side of centre line
4) Most points, but not all are on the center line

42.

The best size wire for measuring the effective diameter of threads is of diameter (p - pitch of Thread , θ - semi angle of thread)	
A.	$p/2 \sec\theta$
B.	$p/2 \cos\theta$
C.	$p \sec\theta$
D.	$p/4 \sec\theta$

43. **A thin coat of _____ is applied on slip gauges to wring properly.**

1) Water
2) Silicone
3) Petrol
4) Castor oil

44. **A pitot static tabe is attached to the aircraft to measure -**

1) Pressure
2) Volume
3) Air speed
4) Density

45. **Rotameter is used to measure -**

1) Volume flow rate
2) Pressure
3) Temperature
4) Velocity

46. **Strain gauge transducers are used to measure -**

1) Tensile Torsion and Compressive forces
2) Tensile forces alone
3) Compressive forces alone
4) Torsional forces alone

47. **The closeness of an instrument reading to the true value of the measurand is known as :**

1) Accuracy
2) Precision
3) Calibration
4) Drift

48. **Which one of the following is NOT true about pitch error in screw thread?**

1) It increases the effective diameter of a bolt
2) It increases the effective diameter of a nut
3) It occurs due to incorrect tool work velocity ratio
4) If there is some error in pitch, then the total length of the thread engaged will be either too great or small

49. **In pneumatic comparator, which one of the following is not correct?**

1) Internal dimensions com be readily measured not only with respect to tolerence but also geometric form
2) No physical contact is made during measurement
3) Eliminates error due to dirt and foreign matter
4) Single gauging head is required for different dimensions

50. A Vernier scale consists of 25 divisions on 12 mm spacing and the main scale has 24 divisions on 12mm spacing. What is the least count ?

1) 0.01 mm
2) 0.02 mm
3) 0.03 mm
4) 0.04 mm

51. Process of removing surface of oxides and scale from metals by acid solution is :

1) Buffing
2) Polishing
3) Galvanising
4) Pickling

52. Calculate the critical radius of insulation for asbestos [K=0.172 W/mk] surrounding a pipe and exposed to room air at 300 K with h = 3 W/km.

1) 57 cm
2) 57 mm
3) 17 cm
4) 17 mm

53. Finned surfaces have improved rate of dissipation due to -

1) Decrease in ambient temperature
2) Increase in the surface area exposed to the surroundings
3) Use of high conductive material
4) Increase in the convective film coefficient

54.

A heat exchanger with heat transfer surface area A and overall heat transfer co-efficient U handles two fluids of heat capacities Cmax and Cmin. The parameter NTU (Number of transfer units) is given by:	
A.	$\frac{A\,Cmin}{U}$
B.	$\frac{A\,Cmax}{U}$
C.	$\frac{AU}{Cmax}$
D.	$\frac{AU}{Cmin}$

55. The sun is emitting radiation with maximum intensity at $\lambda = 0.5\ \mu m$. Determine the surface temperature of the sun.

1) 5796° K
2) 5796°C
3) 2898 °K
4) 2898°C

56.

The natural frequency of free torsional vibrations of a shaft is where q=Torsional stiffness of the shaft I = Mass moment of Inertia	
A.	$2\pi\sqrt{q/I}$
B.	$2\pi\sqrt{q.I}$
C.	$1/2\pi\sqrt{q/I}$
D.	$\frac{1}{2\pi}.\sqrt{q.I}$

57. If Z = absolute viscosity of lubrication in kg/m.s, N - speed of journal rpm. and p - Bearing pressure in N/mm. Then the bearing characteristic number is :

A.	$\frac{ZN}{p}$
B.	$\frac{Zp}{N}$
C.	$\frac{Z}{pN}$
D.	$\frac{pN}{Z}$

58. **The axial force (W_e) required for engaging a cone clutch is given by : Where W_n = Normal force acting on the contact surfaces α = Face angle on the cone μ = Coefficient of friction**

1) $W_e = W_n \sin \alpha$
2) $W_e = W_n (\sin \alpha + \mu \cos \alpha)$
3) $W_e = W_n (\sin \alpha + 0.25 \mu \cos \alpha)$
4) $W_e = W_n \sin \alpha + \mu \cos \alpha$

59. **The center to center distance between two consecutive rivets in a row is :**

1) Margin
2) Pitch
3) Back Pitch
4) Diagonal Pitch

60. **The parallel fillet welded joint is designed for -**

1) Tensile strength
2) Compressive strength
3) Bending strength
4) Shear strength

61. **The measure of relative effectiveness of momentum is:**

1) Reynold's Number
2) Prandtl Number
3) Nusselt Number
4) Grashof Number

62. **The enthalphy drop in the moving blade is 20KJ and that of fixed blade is 30kJ. What is the desree of reaction ?**

1) 0.1
2) 0.2
3) 0.3
4) 0.4

63. **At the entry of the draft tube in the reaction turbine, the pressure of the water is :**

1) Greater than the atmospheric pressure
2) Less than the atmospheric pressure
3) Equal to the atmospheric pressure
4) Zero

64. **In fluid coupling, the ratio of output shaft torque to input shaft torque is:**

1) One
2) Less than one
3) Greater than one
4) Zero

65. **Surging can be reduced by -**

1) Increasing the speed of the fan
2) Reducing the speed of the tan
3) Employing fixed guide vanes
4) Reducing the flow rate

66. **The shock absorbing capacity of a bolt may be increased by -**
1) Increasing its shank diameter
2) Decreasing its shank diameter
3) Tightening the bolts properly
4) Make shank diameter equal to core diameter

67. **Length of cotter, in sleeve and cotter joint is taken as : (where d is the diameter of the rod)**
1) 1.5 d
2) 2.5 d
3) 3 d
4) 4 d

68. **The cone distance and face width of the bevel gear are 200 mm and 50 mm respectively. What is the bevel factor ?**
1) 0.25
2) 0.5
3) 0.75
4) 1

69. **The operation of dividing the periphery workpiece into any number of equal parts is called:**
1) Milling
2) Indexing
3) Gear cutting
4) Hobbing

70. **The maximum vacuum created at the summit of syphon is:**
1) 7.6 m of water
2) 7.6 mm of water
3) 7.6×10^{-2} m of meter
4) 7.6×10^{2} m of water

71. **The square root of the ratio of inertia force of a flowing fluid to the gravity force is called :**
1) Mach's Number
2) Euler's Number
3) Froude's Number
4) Weber's Number

72. **One ton of refrigeration is equal to -**

1) 210 KJ/min
2) 210 KJ/s
3) 210 KJ/hr
4) 210 KJ/day

73. **Thermo electric refrigeration system is based on -**
1) Joule effect
2) Peltier effect
3) Joule - Thomson effect
4) Adiabatic demagnetisation

74. **The subcooling is a process of cooling the refrigerant in a vapor compression refrigeration system before -**
1) Compression
2) Condensation
3) Throttling
4) Evaporation

75. **The process generally used for summer air conditioning is :**
1) Cooling with humidification
2) Cooling with dehumidification
3) Adiabatic cooling
4) Chemical dehumidification

76. **In vapour absorption system, the compressor is the vapour compressor cycle is replaced by -**
1) Condensor
2) Absorber - Generator Assambly
3) Superheater
4) Evaporator

77. **The Volumetric efficiency of an engine whose swept volume is $0.5m^3$/min and volume of intake air $0.4m^3$/ min.**
1) 80% 2) 20%
3) 10% 4) 50%

78. **The numerical control system which is applicable to a drilling machine is :**
1) Point to point system 2) Continuous path system
3) Straight cut system 4) Zig Zag machining system

79. **In a point to point type of NC system .**
1) Control of position and velocity of tool is essential 2) Control of only position of tool is sufficient
3) Control of only velocity of tool is sufficient 4) Neither position nor velocity need be controlled

80. **Burnishing is a -**
1) Finishing process 2) Strengthening process
3) Finishing and strengthening process 4) Hot working process

81. **Electron beam machining process is suitable for the following type of material -**
1) Low melting point and high thermal conductivity 2) High melting point and low thermal conductivity
3) High melting point and high thermal conductivity 4) Low melting point and Low thermal conductivity

82. **An orthogonal cutting operation is being carried out under the following conditions: Cutting speed = 2 m/s, depth of cut = 0.5 mm, chip thickness = 0.6 mm, then the chip velocity is :**

1) 1.66 m/s 2) 2 m/s
3) 2.66 m/s 4) 3.66 m/s

83. **Which part of the cutting tool is prone to crater wear ?**
1) Base 2) Shank
3) Flank 4) Face

84. **A steel workpiece is to be milled. Metal removal rate is $25cm^3$/min. Depth of cut and width of cut are 5 mm and 100 mm respectively. The table feed is :**
1) 40 mm /min 2) 50 mm/min
3) 60 mm/min 4) 70 mm/min

85. **The production of conical surface by gradual reduction in diameter from a cylindrical work piece is :**
1) Honing 2) Taper turning
3) Counter Boring 4) Angle turning

86. **Grand total heat is :**
1) RLH + TSH 2) TLH + RLH
3) TSH - TLH 4) TSH + TLH

87. **The most commonhy used refrigerant in vapour compression system is :**
1) Ammonia 2) R - 12
3) CO_2 4) Ethylene

88. **Which water becomes ice very fast when it is kept inside the freezer ?**
1) Warm water
2) Cold water
3) Water with salt
4) Water with ethanol

89.

Loss of head (h_a)due to sudder contraction of a pipe is given by . V_1 - Velocity of Vena contracta V_2 - Velocity at exit	
A.	$h_a = \frac{V_1^2 - V_2^2}{29}$
B.	$h_a = \frac{0.5\,V_1^2}{29}$
C.	$h_a = \frac{(V_1 - V_2)^2}{29}$
D.	$h_a = \frac{V_1^2 - V_2^2}{49}$

90. **Which one of the following is a controlling technique ?**
1) Pert
2) Kaizen
3) Smed
4) Kan ban

91. **Which is NOT a controlling technique ?**
1) Pert / Cpm
2) Event
3) Budgeting
4) Gantt chart

92. **The coriolis component of acceleration is taken into account for -**
1) Slider crank mechanism
2) Quick return motion mechanism
3) Four bar chain mechanism
4) Double slider crank mechanism

93. **Which of the following mechanism is used to enlarge or reduce the size of a drawing ?**
1) Pantograph
2) Bentograph
3) Watt mechanism
4) Four bar chain

94. **The Cam follower extensively used in aircraft engines is :**
1) Knife edge follower
2) Roller follower
3) Flat spaced follower
4) Spherical spaced follower

95. **Velocity of sound wave in fluid is:**
1) Square root of ratio of change of pressure to the change of density of fluid
2) Ratio of change of pressure to the change of density of fluid
3) Square of ratio of change of pressure to the change of density of fluid
4) Square of ratio of change of density of fluid to change of pressure

96. **The discharge through a rectangular channel is maximum when m - hydraulic mean depth 'd' - depth of flow**
1) m = d/3
2) m = d/2
3) m = 2d
4) m = 3d/2

97. **The upward force exerted by a liquid on a body when the body is immersed in the liquid is known as :**
1) Buoyancy
2) Water force
3) Pressure
4) Hydrostatic force

98. **Flownet is used to analyse the flow problems related to -**
1) Rotational flow
2) Irrotational flow
3) Stream flow
4) Velocity flow

99. **When the pipes are connected in parallel, the loss of head in each pipe is :**
1) Different
2) Zero
3) Same
4) Greater than one

100. **The ratio of the speed of forward and return stroke in shaper could be -**
1) 2 : 3
2) 3 : 2
3) 3 : 1
4) 1 : 1

101. **Milling the workpiece simultaneously on both sides is :**
1) Climb milling
2) Gang milling
3) Square milling
4) Straddle milling

102. **The machine tool which is used as alternative to shaper when the workpiece is too large or too heavy is called:**
1) Slotter
2) Planner
3) Shaper
4) Milling

103. **The drilling machine which has several spindles is called:**
1) Horizontal drilling
2) Mass drilling
3) Vertical of drilling
4) Gang drilling

104. **The operation of forming a conical shape at the end of a drilled hole is :**
1) Counter sinking
2) Boring
3) Counter boring
4) Sinking

105. **Quick return mechanism is used in -**
1) Milling machine
2) Broaching machine
3) Slotting machine
4) Grinding machine

106. **In a flat belt drive the belt can be subjected to a maximum tension of 100 N. In maximum power transmission condition, the centrifugal tension Tc is :**
1) 100 N
2) 50 N
3) 33.33 N
4) 3.33 N

107. **The principal stresses at a point across two perpendicular planes are 75 MN/m^2 (tensile) and 35 MN/m_2 (Tensile). Find the tangential stress and Hs obliquity on a plane at 20° with the major principal plane.**
1) 40 sin 40
2) 20 sin 40
3) 40 sin 20
4) 20 sin 20

108. **The iron bar which is fixed at both ends are heated to higher temperature. Then it is cooled slowly. During cooling, what kind of thermal stress is produced in the rod ?**
1) Tensile stress
2) Shear stress
3) Compressive stress
4) Yield stress

109. **The rise of water level, which takes place due to the transformation of the unstable shooting flow to the stable streaming flow is called :**
1) Critical flow
2) Torrential flow
3) Tranquil flow
4) Hydralic jump

110. Continuity equation is based on the principle of -

1) Conservation of mass
2) Conservation of momentum
3) Conservation of Energy
4) Conservation of work

111. The ratio of static or pressure head change occuring in the rotor to the total change across the stage -

1) Pressure Ratio
2) Degree of reaction
3) Reheat factor
4) Aspect ratio

112. The specific speed of a hydraulic turbine depends on -

1) Speed and power developed
2) Speed, power developed and head of water
3) Speed
4) Discharge and power developed

113. Centrifugal compressor is suitable for -

1) Low specific speed, high pressure ratio and low mass flow rate
2) High specific speed
3) Low pressure ratio
4) High specific speed

114. At the point of contraflexure, the value of bending moment in a beam is :

1) One
2) Zero
3) Greater than one
4) Less than one

115.

A cantilever of length ℓ is carrying uniformly distributed load of 'w' per unit runover the whole span. The deflection at the free end is given by :	
A.	$\frac{w\ell^4}{8EI}$
B.	$\frac{w\ell^3}{8EI}$
C.	$\frac{w\ell^4}{4EI}$
D.	$\frac{w\ell^3}{4EI}$

116. Modulus of Rigidity is :

1) Lateral stress / lateral strain
2) Shear strain / Shear stress
3) Shear stress / Shear Strain
4) Lateral Strain / Lateral stress

117. Limit within which Hooke's Law holds good is known as -

1) Yield point
2) Proportional limit
3) Elastic limit
4) Plastic limit

118. Which part of the shaft cross section has maximum shear stress ?

1) 1 mm from the centre of the surface
2) Centre of the surface
3) Outermost surface
4) 2 mm from the centre of the surface

119. The strain energy stored by the body within elastic limit when loaded externally is called.

1) Resilience
2) Toughness
3) Permanent stored energy
4) Residual stress

120. What is the rivet diameter of butt joint if the thickness of the plate is 25 mm ?

1) 30 mm
2) 25 mm
3) 20 mm
4) 15 mm

121. A load of 4000 N has to be placed at the end of a vertical rod with stress induced is 80 N/mm^2. The diameter of the rod is :

1) 79.79 mm
2) 7.979 mm
3) 18.181 mm
4) 81.81 mm

122.

The number of buckets on the periphery of a pelton wheel is given by -	
A.	$\frac{D}{2d}+5$
B.	$\frac{D}{2d}+10$
C.	$\frac{D}{2d}+20$
D.	$\frac{D}{2d}+15$

123. Which force contributes to driving the rotor in turbo machines ?

1) Axial force
2) Tangential force
3) Radial force
4) Centrifugal force

124. In impulse turbines, the energy transfer takes place at -

1) Rotor
2) Nozzle
3) Stator blades
4) Casing

125. The thermal conductivity of an insulating material covered to a steel pipe is 1 W/mk. If the convective heat transfer coefficent between the insulation and air is 8 W/m^2K, the critical radius of insulation is :

1) 8 m
2) 0.125m
3) 0.125cm
4) 1 cm

126.

Forced convective heat transfer is predominant when -	
A.	$\left(\frac{Gr}{Re^2}\right) \ll 1$
B.	$\left(\frac{Gr}{Re^2}\right) \approx 1$
C.	$\left(Gr/Re^2\right) \gg 1$
D.	There is no appreciable change in temperature

127. Heat transfer from higher temperature to low temperature takes place according to -

1) Fourier Law
2) First Law of Thermodynamics
3) Second Law of Thermodynamics
4) Zeroth Law of Thermodynamics

128.

The relation $\nabla^2 T = O$ is referred to as :	
A.	Poisson's equation
B.	Laplace equation
C.	Fourier heat conduction
D.	Radiation equation

129.

When the addenda on pinion and wheel is such that the path of approach and path of recess are half of their maximum possible values, then the length of the path of contact is given by where r = Pitch circle radius of the pinion R = Pitch circle radius of the driver and ϕ = Pressure angle	
A.	$\frac{(r+R)\sin\phi}{2}$
B.	$\frac{(r+R)\cos\phi}{2}$
C.	$\frac{(r+R)\tan\phi}{2}$
D.	$\frac{(r+R)\sec\phi}{2}$

130. When the axes of first and last gear are co-axial, then gear train is known as :

1) Simple gear train
2) Compound gear train
3) Reverted gear train
4) Epicyclin gear train

131.

The ratio of the height of a Porter governor (when the length of arms and links are equal to the height of a Watt's governor) is: where m = Mass of the ball M = Mass of the load on the sleeve	
A.	$\frac{m}{m+M}$
B.	$\frac{M}{m+M}$
C.	$\frac{m+M}{m}$
D.	$\frac{m+M}{M}$

132. The maximum efficiency of a screw Jack is given by -

A.	$\frac{1+\sin\varphi}{1-\sin\varphi}$
B.	$\frac{1-\sin\varphi}{1+\sin\varphi}$
C.	$\frac{\mu-\sin\varphi}{1+\sin\varphi}$
D.	$\frac{\mu+\sin\varphi}{1-\sin\varphi}$

133. The relation between the pitch of the chain (P), pitch circle diameter of the sprocket (d) and number of teeth on the sprocket (T) is given by -

A.	$P = d\sin\left(\frac{180^\circ}{T}\right)$
B.	$P = d\cos\left(\frac{180^\circ}{T}\right)$
C.	$P = d\sin\left(\frac{T}{180^\circ}\right)$
D.	$P = d\cos\left(\frac{T}{180^\circ}\right)$

134. Heat transfer in liquids and gases takes place by -

1) Conduction
2) Convection
3) Radiation
4) Conduction & Radiation

135. The gross head at a turbine working with a specific speed at 200 rpm, having frictional head at 10m and net head as 150m is :

1) 162.5m
2) 160 m
3) 172.5 m
4) 212 m

136. For pelton wheel turbine having a jet ratio at 10, number of buckets to be used are -

1) 16
2) 22
3) 20
4) 17

137. The angular limit to which the incident sun ray may deviate from the normal to the aperture plane and still reach the absorber:

1) Aperture angle
2) Acceptance angle
3) Absorber angle
4) Incident angle

138. In a gas turbine plant, a regenerator increases -

1) Work output
2) Pressure ratio
3) Thermal efficiency
4) Water temperature

139. Consider a resistance thermometer with three essential elements namely A, B and C. If 'A' takes the temperature signal and transforms it into resistanee signal , element 'B' transforms the resistance signal in to current signal, element 'C' transforms the current signal into display of a movenent at a pointer across a scale, which of these is a sensor, signal processor and data presentation ?

1) B - Sensor, A - Signal processor , C - Data presentation
2) A - sensor, B-signal processor, C-Data presentation
3) C - sensor, A-signal processor , B-Data presentation
4) B-Sensor , C-Signal processor, A-Data presentation

140. Line of impact is :

1) Common surface to the two colliding bodies
2) Common tangent to the two colliding bodies
3) Common normal to the two colliding bodies
4) Common point to the two colliding bodies

141. A differential gear in an automobile is a -

1) Compound gear train
2) Epicyclic gear train
3) Simple gear train
4) Bevel gear train

142. A governor is said to be hunting, if the speed of the engine.

1) fluctuates continuously above and below the mean speed
2) Fluctuates above the mean speed
3) Fluctuates below the mean speed
4) Constant

143. A disturbing mass m_1 attached to a rotating shaft is balanced by a single mass m_2 attached in the same plane of rotation as that of m_1 such that -

1) $m_1r_2 = m_2r_1$
2) $m_1r_1 = m_2r_2$
3) $m_1r_2 = 2m_2r_1$
4) $m_1r_1 = 2m_2r_2$

144.

In vibration isolation system, if $\frac{w}{w_n} > 1$, then the phase difference between the transmitted force and the disturbing force is :	
A.	180°
B.	90°
C.	270°
D.	45°

145. A connecting rod subjected to axial load may buckle with -

1) X axis as neutral axis
2) Y axis as neutral axis
3) X axis (or) Y axis as neutral axis
4) Z axis as neutral axis

146. How many equations are used in the equilibrium of particle in space?

1) 2
2) 4
3) 5
4) 3

147. A simply supported beam of span 5 m carrying UDL of 20 KN/m for a length of 3 m from left support A. Reactions at A and B are :

1) R_A = 20 KN and R_B = 40 KN
2) R_A = 19 KN and R_B = 41 KN
3) R_A = 40 KN and R_B = 20 KN
4) R_A = 42 KN and R_B = 18 KN

148. A particle moves along a straight line so that its displacement in metres from a fixed point to $s = 2t^3 + 4t^2 - 6t + 8$. The acceleration after 4 seconds is :

1) 8 m/s^2
2) 176 m/s^2
3) 122 m/s^2
4) 56 m/s^2

149. When a helical compression spring is subjected to an axial compressive load, the stress induced in the wire is :

1) Tensile stress
2) Compressive stress
3) Shear stress
4) Bending stress

150. The torque developed by a disc clutch is given by - (Where w = Axial force with which the friction surfaces are held together μ = Coefficient of friction R = Mean radius of friction surface

1) T = 0.25 μWR
2) T = 0.5 μWR
3) T = 0.75 μWR
4) T = μWR

151. In thrust bearing, the load acts :

1) Parallel to the axis of rotation
2) Perpendicular to the axis of rotation
3) Along the axis of rotation
4) It may be any direction

152. The displacement of a flat faced follower when it has contact with the flank of a circular arc cam, is given by : (where R = Radius of the slank r_1 = minimum radius of the cam and □ = angle turned by the cam for contact with the circular flank)

1) R(1 - cos □)
2) R(1 - sin □)
3) $(R - r_1)$ (1 - cos □)
4) $(R - r_1)$ (1 - sin □)

153. Two forces of 10N and 20N are acting at a point in such a way that both the forces are perpendicular to each other. What is the resultant of these forces ?

1) 22.36
2) 23.63
3) 26.23
4) 21.36

154. The value of dryness reaction for dry saturated vapour is :

1) One
2) Less than one
3) Zero
4) Greater than one

155. The value of universal gas constant is :

1) 8.3143 KJ/kg mol K
2) 8.3143 J/Kg mol K
3) 831.43 KJ/Kg mol K
4) 83.143 KJ/Kg mol K

156. The relationship among pressure and temperature in a reversible adiabatic process for an ideal gas is:

A.	$\frac{T_2}{T_1}=\left(\frac{P_1}{P_2}\right)^{\frac{\nu-1}{\nu}}$
B.	$\frac{T_2}{T_1}=\left(P_2/P_1\right)^{1/\nu}$
C.	$\frac{T_2}{T_1}=\left(\frac{P_1}{P_2}\right)^{\nu-1}$
D.	$\frac{T_2}{T_1}=\left(\frac{P_2}{P_1}\right)^{\frac{\nu-1}{\nu}}$

157. In a Carnot engine , when heat is supplied by a source:

1) The temperature of the source decreases
2) The temperature of the source remains constant
3) The temperature of sink increases
4) The temperature of both source and sink decreases

158. The heat transfer for constant pressure is equal to -

1) Change in volume
2) Change in entropy
3) Change in enthalpy
4) Change in temperature

159. In a reciprocating steam engine, which of the following forms a Kinematic link ?

1) Cylinder and piston
2) Piston rod and connecting rod
3) Crankshaft and flywheel
4) Flywheel and Engine frame

160. A ball and a socket joint forms -

1) Spherical pair
2) Turning pair
3) Rolling pair
4) Sliding pair

161. The Grubler's criterion for determining the degrees of freedom (n) of a mechanism having plane motion is:

1) $n = 2(\ell-1) - 3j$
2) $n = 3(\ell-1) - 2j$
3) $n = (\ell-1) - 2j$
4) $n = (\ell-1) - 3j$

162. Which of the following is an inversion of double slider crank chain ?

1) Elliptical trammels
2) Coupling road
3) Pendulum pump
4) Oscillatory cylinder engine

163. The number of instantaneous centers (n) that a four bar mechanism has is :

1) 10
2) 6
3) 4
4) 3

164. The direction of linear velocity of any point on a link with respect to another point on the same link is :

1) Perpendicular to the link joining the points
2) Parallel to the link joining the points
3) 45° to the link joining the points
4) 30° to the link joining the points

165.

The axial thrust on the worm (W_A) is given by _____. Where 'λ' is lead angle and W_T is Tangential load on the tooth.	
A.	$W_A = \frac{1}{W_T \tan\lambda}$
B.	$W_A = \frac{\tan\lambda}{W_T}$
C.	$W_A = W_T \times \tan\lambda$
D.	$W_A = W_T / \tan\lambda$

166. The length of the rod is 10 meter and its weight is 100 kg. One of its end is fixed in the wall. The moment about the fixed end of the rod and will be :

1) 1000 Nm
2) 9810 Nm
3) 4905 Nm
4) 500 Nm

167. A man weighs 980 N on earth. What will be his weight in moon and sun where gravitation force of moon $g_m = 1.7\ m/s^2$ and that of the sun $g_s = 270\ m/s^2$

1) $W_m = 170$ N and $W_s = 27000$ N
2) $W_m = 1666$ N and $W_s = 264600$ N
3) $W_m = 17$ N and $W_s = 2700$ N
4) $W_m = 16.66$ N and $W_s = 2646$ N

168. While a human walking on a smooth floor surface, what kind of reactions are produced under his foot ?

1) Horizontal reaction
2) Vertical reaction
3) Horizontal and vertical reactions
4) No reaction

169. A ship is sailing north at a velocity of 5 m/s. The current is taking it east at the rate of 3 m/s, and a sailor is climbing a vertical mast at the rate of 1.5 m/s. What is the absolute velocity the sailor ?

1) 5.02 m/s
2) 6.02 m/s
3) 9.5 m/s
4) 6.5 m/s

170. Polar moment of inertia is obtained from :

1) Lami's theorem
2) Perpendicular axis theorem
3) Parallelogram of forces
4) Polygon law of forces

171. The swept volume and clearance volume of an Otto cycle are 0.0184 m^3 and 0.00262 m^3 respectively. The value of compression ratio is :

1) 7
2) 8
3) 9
4) 5.99

172. The combustion of fuel in IC Engine refers to -

1) Reversible process
2) Adiabatic process
3) Iso thermal process
4) Irreversible process

173. The centrifugal tension in the belt -

1) Increases the power transmitted
2) Decreases the power transmitted
3) Has no effect on the power transmitted
4) Is equal to maximum tension in the belt

174. **The flat belt fension at the tight side is 2400 N. The mass of the belt per unit length is 2kg/m. Find the velocity of the belt for the maximum power transmission.**

1) 10 m/s
2) 20 m/s
3) 30 m/s
4) 40 m/s

175. **Lewis equation in spur gears is applied -**

1) To weaker of the pinion or gear
2) To the gear
3) To the pinion
4) to stronger of the pinion or gear

176. **In a stepped pulley drive , the speed of driven shaft is changed by -**

1) without stopping the driving shaft
2) Stopping the driving shaft
3) Lower the speed of driving shaft
4) Increase the speed of driving shaft

177. **In a spur gear arrangement, the diameter of the pinion is 100 mm and its number of teeth is 40. The diameter of the gear is 50 mm and its number of teeth is 20. Determine whether the above gears mesh correctly.**

1) Do not mesh
2) Mesh correctly
3) Transmit less power
4) Produces the backlash

178. **If T is the actual number of teeth on a helical gear and □ is helix angle of the teeth. The formative number of teeth is :**

1) $T \sin^3 \square$
2) $T \sec^3 \square$
3) $T \cos^3 \square$
4) $T \tan^3 \square$

179. **When bevel gears having equal teeth and equal pitch angles connect two shafts whose axes intersect at right angle, then they are known as :**

1) Mitre gears
2) Internal bevel gears
3) Crown bevel gears
4) Angular bevel gears

180. **"If the gas in a closed system is maintained at constant pressure, the volume of gas will vary directly with the absolute temperature " is stated by -**

1) Charle's law
2) Boyle's law
3) Joule's law
4) Newton law

181. **The specific volume of steam at 10 bar pressure is recorded as 0.18 m^3 / kg. Find the quality of steam take Vg = 0.19 m^3 / kg.**

1) 0.9 , wet
2) 0.9, dry
3) 1.1, wet
4) 1.1, dry

182.

The inequality of Clausius state $\oint \frac{dq}{T} > 0$ is	
A.	Irreversible
B.	Reversible
C.	Impossible
D.	Possible

183. Velocity of sound at 400 K is given by -

1) 12.67 m/s
2) 400 m/s
3) 2157.7 m/s
4) 225.8 m/s

184.

The propulsive efficiency is:	
A.	$\frac{m(c_j^2 - u^2)}{2m_f Q_f}$
B.	$\frac{2\sigma}{1+\sigma}$
C.	$\frac{Q_s - Q_r}{Q_s}$
D.	$\frac{m(c_j^2 - u^2)}{2m_f Q_f}$

185. In centre less grinding operation, the regulating is inclined at -

1) 1° to 5°
2) 9° to 12°
3) 12° to 15°
4) 15° to 20°

186. Holes is Nylon buttons are made by -

1) EDM
2) ECM
3) USM
4) LBM

187. Machining is best suited for ultrasonic -

1) Non - ferrous metals
2) Ferrous metals
3) Brittle materials
4) Spongy materials

188. Tumbling is a process of -

1) Improving the fatigue limit
2) Imparting residual stress to surface
3) Cleaning the surface of small parts
4) Improving the creep limit

189. When will the string diagram be used in work study ?

1) To reduce the number or machines
2) Team or workers are doing multiple activities
3) When the paths are many and repetitive
4) When the number of equipments are less

190. Gantt chart provides the information about -

1) Break even point
2) Production schedule
3) How to determine the price of a product
4) Production technique

191. The temperature of the gas when it is adiabatically decelerated to zero velocity at zero elevation is called .

1) Stagnation temperature
2) Constant temperature
3) Iso thermal temperature
4) Adiabatic temperature

192. In a refrigeration system, the value of COP is :

1) Equal to one
2) Less than one
3) Zero
4) Greater than one

193. The Dry bulb temperature of air during sensible heating.

1) Increases
2) Remains constant
3) Decreases
4) May increase or decrease

194. The device which converts kinetic energy of the fluid into pressure energy is :

1) Nozzle
2) Diffuser
3) Compressor
4) Turbine

195. The flow in a constant area duct with friction in the absence of work and heat transfer is :

1) Fanno flow
2) Iso thermal flow
3) Rayleigh flow
4) Adiabatic flow

196. A jet engine works on the principle of conservation of -

1) Mass
2) Discharge
3) Energy
4) Momentum

197. A turbo prop has an additional feature compared to turbo jet in having.

1) Grid passages
2) Inlet diffuser
3) Inter cooler
4) Reduction Gear

198. In rocket propulsion, the oxygen for its combustion of fuel is taken from :

1) Surrounding air
2) The rocket itself
3) Compressed atmospheric air
4) Surrounding air and compressed atmospheric air

199. The escape velocity at the earth's surface is about -

1) 11.2 m/s
2) 11.2 km/hr
3) 11.2 km/s
4) 11.2 m/hr

200. In inventory EOQ means :

1) The quantity which when ordered will minimize the total inventory cost
2) Average quantity will minimize the total inventory cost
3) Maximum quantity which going to order
4) Minimum quantity order