1. Degree of freedom of a constrained mechanism is

(A) Less than one

(B) Greater than one

(C) Equal to one

(D) Equal to zero

2. A mechanism in which two links of equal length are placed adjacent and the longer link is fixed , is called

(A) Parallelogram

(B) Deltoid mechanism

(C) Galloway mechanism

(D) Crank rocker mechanism

3. Angle of Repose as referred to friction is equal to

(A) $\propto = \tan^{-1} \mu$

(B) $\propto = \sin^{-1} \mu$

(C) $\propto = \cot^{-1} \mu$

(D) $\propto = \text{cosec}^{-1} \mu$

4. For constant velocity ratio with large centre distance, which one of the following drives is recommended?

(A) Flat belt

(B) V – belt

(C) Rope

(D) Chain

5. In a differential band brake, the effort required for clockwise rotation of drum compared to counterclockwise rotation is

(A) Greater

(B) Equal

(C) Less

(D) Unpredictable

6. Which of the following governor cannot be isochronous?

(A) Watt

(B) Hartnell

(C) Proel

(D) Porter

7. In a tangent cam and roller follower, base circle diameter is 60 mm and roller diameter is 20 mm. Cam rotates for 60º with roller just leaving contact with the flank. The lift of the follower at this moment is

(A) 40 mm
(B) 20 mm
(C) 10 mm
(D) 80 mm

8. The profile of a cycloidal gear tooth below the pitch circle is

(A) Hypocycloid
(B) Epicycloid
(C) Involute
(D) Parabolic

9. In a gear train where axes of gears have motion, the gear train is called

(A) Simple
(B) Epicyclic
(C) Compound
(D) Reverted

10. In a reciprocating horizontal engine, the inertia force due to reciprocating mass helps the piston effort at

(A) $\theta = 45^0$
(B) $\theta = 120^0$
(C) $\theta = 30^0$
(D) $\theta = 180^0$

11. In a symmetrical two cylinder V – engine, the resultant force is proportional to

(A) $\cos\theta$
(B) $\cos 2\theta$
(C) $\sin\theta$
(D) $\sin 2\theta$

12. The transmissibility is same for all values of damping factors at frequency ratio of

(A) 1
(B) 2
(C) $\sqrt{2}$
(D) $\frac{1}{\sqrt{2}}$

13. The gyroscopic effects due to rotating parts of a turbojet engine of an air craft on a curved course depend on

(A) Flight velocity

(B) Flight altitude

(C) Radius of the curve

(D) Flight velocity and radius of the curve.

14. A 25 cm diameter cylinder is composed of material with specific gravity 0.8. It will float in water with the ends horizontal if its length is

(A) 30 cm

(B) 25 cm

(C) 20 cm

(D) 15 cm

15. The velocity of an airplane is measured with a pitot tube. If the pitot tube measures 800 mm of water, estimate the speed of the airplane if air density is 1.23 kg/m^3

(A) 125 m/s

(B) 113 m/s

(C) 86 m/s

(D) 36 m/s

16. What is the energy requirement of an 85% efficient pump that transports 40 L/s of water if the pressure increases from 200 kPa to 1200 kPa ?

(A) 4.8 KW

(B) 14.2 KW

(C) 34.2 KW

(D) 47.1 KW

17. For a new valve to be designed for liquid benzene to flow, following number needs to be considered

(A) Froude Number

(B) Reynolds Number

(C) Mach Number

(D) Euler Number

18. A 4 m long smooth cylinder experiences a drag of 60 N when subjected to an atmospheric air speed of 40 m/s. The diameter of the cylinder in this case is

(A) 12.7 mm

(B) 26 mm

(C) 6.3 mm

(D) 4.1 mm

19. When a block of ice floating in water in a container melts, the level of water in the container

(A) Rises

(B) Falls

(C) Remains same

(D) First falls and then rises

20. The ratio of head loss to the total head for the power transmitted to be maximum is

(A) $\frac{1}{2}$

(B) $\frac{1}{3}$

(C) $\frac{2}{3}$

(D) $\frac{1}{4}$

21. The laminar sublayer exists

(A) Only in laminar boundary layers

(B) Only in smooth turbulent boundary layers

(C) Only in rough turbulent boundary layers

(D) In all turbulent boundary layers

22. Nozzle meter is used to measure

(A) Flow rate

(B) Volume

(C) Velocity

(D) Pressure

23. The coefficient of discharge for a venturimeter is

(A) 0.82
(B) 0.72
(C) 0.91
(D) 0.98

24. At the critical point, the temperature of water is equal to

(A) 0 ºC
(B) 100 ºC
(C) 374 ºC
(D) –100 ºC

25. In a reversible adiabatic process, the work transfer is equal to

(A) decrease in enthalpy
(B) decrease in internal energy
(C) heat transfer
(D) the product of pressure and change in volume

26. An adiabatic heat exchanger is used to heat cold water from 15 ºC entering at a rate of 5 kg/s by hot air at 90 ºC entering also at 5 kg/s. If the exit temperature of air is 20 ºC, the exit temperature of water is

(A) 27 ºC
(B) 85 ºC
(C) 32 ºC
(D) 52 ºC

27. A carnot cycle consists of

(A) Two isothermal and two isentropic processes
(B) Two constant volume and two isentropic processes
(C) Two constant pressure and two isentropic processes
(D) One constant volume, one constant pressure and two isentropic processes

28. A heat pump is absorbing heat from a cold outdoor at 5 ºC and supplying heat to a house at 22 ºC at a rate of 18 MJ/hr. The power consumed by the pump is 2.5 kW. COP of heat pump is

(A) 0.5
(B) 1.0
(C) 2.0
(D) 5.0

29. Entropy is function of

(A) Work transfer

(B) Volume

(C) Temperature

(D) Pressure

30. The condition of irreversibility of a cycle is (for cyclic integral)

(A) $\int \frac{\delta Q}{T} < 0$

(B) $\int \frac{\delta Q}{T} > 0$

(C) $\int \frac{\delta Q}{T} = 0$

(D) $\int \frac{\delta Q}{T} = 5$

31. Availability functions of a closed system is

(A) $\varnothing = u + p_0 v - T_0 s$

(B) $\varnothing = u + p_0 dv - T_0 ds$

(C) $\varnothing = du + p_0 dv - T_0 ds$

(D) $\varnothing = u + p_0 v + T_0 s$

32. The specific heat relation $c_p - c_v$ is equal to

(A) $\frac{\vartheta T \beta^2}{K}$

(B) $\frac{\vartheta T K}{\beta}$

(C) $\frac{\vartheta T K}{\beta^2}$

(D) $\frac{\vartheta^2 T \beta}{K}$

33. Flow of fluid is called Transonic when

(A) $M > 1$

(B) $M = 1$

(C) $M < 1$

(D) $0.8 > M > 1.2$

34. Whole friction loss in a convergent divergent nozzle occurs in

(A) Divergent portion

(B) Convergent portion

(C) Throat

(D) Entire nozzle

35. For same maximum pressure and temperature among Otto, Diesel and Dual cycles

(A) Diesel cycle is more efficient

(B) Otto cycle is more efficient

(C) Dual cycle is more efficient

(D) Otto and Diesel cycles are having same value

36. In the Rankine cycle, the heat is added

(A) Isothermally

(B) Isochorically

(C) Isobarically

(D) Adiabatically

37. Azeotropic refrigerants are mixture of

(A) Primary and secondary refrigents

(B) Ammonia and water

(C) CFC_S and HFC_S

(D) HFC_S and HFC_S

38. The process of cooling air at same humidity ratio is known as

(A) Sensible Heating

(B) Sensible Cooling

(C) Humidification

(D) Dehumidification

39. The variety of coal having highest calorific value is

(A) Steam Coal

(B) Lignite

(C) Anthracite

(D) Bituminous coal

40. A Cornish boiler is

(A) Multi tubular boiler

(B) Water tube boiler

(C) Fire tube boiler

(D) A boiler in which flue gas surrounds the tube

41. The indicator diagram is taken with the help of

(A) Crank shaft

(B) Connecting rod

(C) Eccentric

(D) Indicator

42. In steam turbine, the stage efficiency is also called as

(A) Blade Efficiency

(B) Diagram efficiency

(C) Gross Efficiency

(D) Ideal Efficiency

43. In a diesel engine, fuel consumption against brake power is

(A) Parabolic

(B) Linear

(C) Hyperbolic

(D) Non-predictable

44. The maximum pressure ratio in a single stage reciprocating air compressor is limited to

(A) 2

(B) 4

(C) 7

(D) 10

45. In a turbojet engine, the diffuser is fitted at the following

(A) nose

(B) After compressor

(C) After turbine

(D) Before turbine

46. In summer air conditioning, RH of conditioned space is generally kept

(A) 40%

(B) 50%

(C) 60%

(D) 70%

47. In a 4 – cylinder petrol engine the standard firing order is

(A) 1 – 2 – 3 – 4

(B) 1 – 4 – 3 – 2

(C) 1 –3 – 2 – 4

(D) 1 – 3 – 4 – 2

48. Critical path shall be along the activities having total float equal to

(A) Positive value

(B) Negative value

(C) Other than zero

(D) zero

49. PERT and CPM techniques are ultimately considered as techniques

(A) To study a project

(B) To make decisions

(C) To estimate cost

(D) To evaluate time

50. A transportation problem is said to be balanced if

(A) Number of origins and odd number of destinations are to be equal

(B) Odd number of origins and odd number of destinations

(C) Even number of origins and even number of destinations.

(D) Total capacity of the origins and total capacity of destinations are same

51. The technique used for solving assignment problems is

(A) Hungarian method

(B) Vogel's method

(C) Simplex method

(D) Taylor's method

52. A Venturimeter of 20 mm throat diameter is used to measure the velocity of water in a horizontal pipe of 40 mm dia. If the pressure difference between the pipe and throat sections is found to be 30 kPa, then neglecting frictional losses, the flow velocity is

(A) 0.2 m/s

(B) 1.0 m/s

(C) 1.4 m/s

(D) 2.0 m/s

53. Sequencing is the subject of

(A) Routing

(B) Scheduling

(C) Expediating

(D) Regression

54. Motion study was developed by

(A) Taylor

(B) Gilberth

(C) Mundel

(D) Tindel

55. In time study, the rating factor is applied to determine

(A) Standard time of a job

(B) merit rating of the worker

(C) Incentive rate

(D) Normal time

56. If the demand for an item is doubled and the ordering cost is halved, the economic order quantity

(A) Remains constant

(B) Increases by a factor $\sqrt{2}$

(C) Is doubled

(D) Is halved

57. Break even analysis represents the relationship between

(A) Cost and volume of production

(B) Fixed cost and variable cost

(C) Variable cost and sales revenue

(D) Total overhead and volume of production

58. Steel with 0.84 % carbon is known as

(A) Eutectic Steel

(B) Hypoeutectic steel

(C) Hyper eutectic steel

(D) Alloy steel

59. The process intended for improving machinability by slightly lowering the hardness is

(A) Normalizing

(B) Full Annealing

(C) Process Annealing

(D) Spherodising

60. Primary deformation zone is

(A) Along the shear plane

(B) Perpendicular to shear plane

(C) At the tool work foci interface

(D) At the chip tool interface

61. A hole of 20 mm is punched on a metallic plate of HSS of thickness 1 mm, the punch size and die size shall be in mm

(A) 20 ; 20.1

(B) 20.1 ; 20

(C) 20 ; 20.05

(D) 20.05 ; 20

62. Cast steel crankshaft surface is hardened by

(A) Nitriding

(B) normalizing

(C) Carburizing

(D) Induction Heating

63. The alloy element mainly used to improve the endurance strength of steel materials is

(A) Nickel

(B) Vanadium

(C) Molybdenum

(D) Tungsten

64. Eutectic reaction for Iron-Carbon system occurs at

(A) 600 ºC

(B) 723 ºC

(C) 1147 ºC

(D) 1493 ºC

65. The blade of a power saw is made of

(A) Boron steel

(B) High speed steel

(C) Stainless steel

(D) malleable steel

66. Quartz is a material of the following

(A) Ferroelectric material

(B) Ferromagnetic material

(C) Piezo electric material

(D) diamagnetic material

67. Addition of Magnesium to Cast Iron increases its

(A) Hardness

(B) Ductility and strength is tension

(C) Corrosion resistance

(D) Creep strength

68. When a steel is heated to above its upper critical temperature, the structure produced is one of

(A) Martensite

(B) Austenite

(C) Pearlite

(D) Sorbite

69. Which of the following materials will require the largest size of riser for the same size of casting ?

(A) Aluminium

(B) Cast Iron

(C) Steel

(D) Copper

70. The true strain for low carbon steel bar which is doubled in length by forging is

(A) 0.0307
(B) 0.517
(C) 0.693
(D) 1.057

71. The bending force required for V – bending, U – bending and edge bending will be in the ratio

(A) 1 : 2 : 0.5
(B) 2 : 1 : 0.5
(C) 1 : 2 : 1
(D) 1 : 1 : 1

72. In oxy – acetylene gas welding, for complete combustion, the volume of oxygen required per unit ton of acetylene is

(A) 1
(B) 1.5
(C) 2
(D) 2.5

73. A milling cutter having 8 teeth is rotating at 1500 rpm. If the feed per tooth is 0.1 mm, the value of the table speed in mm per minute is

(A) 120
(B) 187
(C) 125
(D) 70

74. The rake angle in a drill

(A) Increases from centre to periphery
(B) Decreases from centre to periphery
(C) Remains constant from centre to periphery
(D) Is irrelevant to the drilling operation

75. A grinding wheel of 150 mm diameter is rotating at 3000 rpm. The grinding speed is

(A) 7.5 π m/s
(B) 15 π m/s
(C) 45 π m/s
(D) 450 π m/s

76. In EDM process, the tool is made of

(A) Copper

(B) High speed steel

(C) Cast Iron

(D) Plain carbon steel

77. The long plastic rods and tubes are produced by

(A) Compression moulding

(B) Extrusion

(C) Injection moulding

(D) Blow moulding

78. Feed drives in CNC milling machines are provided by

(A) Synchronous motors

(B) Induction motors

(C) Steppers motors

(D) Servomotors

79. Francis, Kaplan and propeller turbines fall under the category of

(A) Impulse turbine

(B) Reaction turbine

(C) Impulse Reaction combineal

(D) Axial flow

80. Reflectors of a nuclear reactor are made of

(A) Boron

(B) Cast Iron

(C) Beryllium

(D) Steel

81. Normal heptane content in fuel for SI engines

(A) Retards auto ignition

(B) Accelerates auto ignition

(C) Does not affect auto ignition

(D) Stops auto ignition itself

82. In a gas turbine cycle, the turbine output is 600 KW, the compressor work is 400 KW and the heat supplied is 1000 KW. Thermal efficiency of this cycle is

(A) 80 %

(B) 60 %

(C) 40 %

(D) 20 %

83. Annual demand for a product costing ₹ 100 per piece is 900. Ordering cost per order is ₹ 100 and inventory holding cost is ₹ 2 per unit per year. The economic lot size is

(A) 200

(B) 300

(C) 400

(D) 500

84. Set of links and joints that constitute arm and the wrist of a robot is called as

(A) Flexible Structure

(B) Fixed Structure

(C) Articulated Structure

(D) Balance Structure

85. Study of communication and control particularly between human and robot is called

(A) Compliance

(B) Cybernetics

(C) Interfacing

(D) Controlling

86. Following has the maximum Malleability :

(A) Aluminum

(B) Copper

(C) Lead

(D) Bronze

87. Monel metal is an alloy of the following :

(A) Cu and Cr

(B) Ni and Cu

(C) Ni and Cr

(D) Cu,Ni and Cr

88. An odometer is used to measure

(A) distance

(B) force

(C) velocity

(D) smell

89. For a strain gauge ,a high gauge factor results in

(A) zero drift

(B) linear response

(C) low hysteresis

(D) high sensitivity

90. Which one of the following manufacturing processes requires the provision of gutters ?

(A) closed die forging

(B) centrifugal casting

(C) investment casting

(D) impact extrusion

91. Gear cutting on a milling machine using an involute profile cutter is

(A) gear forming process

(B) gear generating process

(C) shaping process

(D) highly accurate gear producing process

92. How many links are there in a Peaucellier mechanism ?

(A) 2

(B) 4

(C) 6

(D) 8

93. Thermal diffusivity is defined as

(A) $\frac{\kappa}{\rho C_p}$

(B) $\frac{\rho\kappa}{C_p}$

(C) $\frac{\kappa C_p}{\rho}$

(D) $\frac{\rho}{\kappa C_p}$

94. The maximum possible heat transfer occurs if the surface temperature of the fin is of the base temperature

(A) Half

(B) Twice

(C) Equal to

(D) Less than

95. Lumped Parameter analysis is valid if the value of Biot Number is less than

(A) 0.01

(B) 0.1

(C) 10

(D) 100

96. The Reynolds number is the ratio of inertia force to

(A) Gravitational Force

(B) Viscous Force

(C) Kinetic Force

(D) Potential Force

97. In free convection, the product of Grashoff and Prandtl number is called as

(A) Nusselt number

(B) Reynolds Number

(C) Kirchhoff number

(D) Rayleigh Number

98. If duct size is 0.2 m × 0.2 m, the equivalent hydraulic diameter is

(A) 0.2 m

(B) 0.25 m

(C) 0.3 m

(D) 0.4 m

99. Which properties will remain constant in case of condensation ?

(A) p, v

(B) v, T

(C) p, T

(D) p, K

100. Unit of thermal resistance is

(A) $\frac{Wm^2}{K}$

(B) $\frac{m^2}{KW}$

(C) $\frac{m}{KW}$

(D) $\frac{m^2K}{W}$

101. For white body, following is applicable

(A) $\propto = 1$

(B) $\psi = 1$

(C) $\rho = 1$

(D) $\beta = 1$

102. $\frac{C_{\min}}{C_{\max}}$ for gas turbines is equal to

(A) 0

(B) 1

(C) 2

(D) ∞

103. The highest value of thermal conductivity is expected for

(A) solid ice

(B) melting ice

(C) water

(D) steam

104. Heat Treatment involving heating of steel above the upper critical temperature and then cooling it in air is known as

(A) Annealing

(B) Tempering

(C) Normalizing

(D) Austempering

105. The moment of inertia of an area is always least with respect to the

(A) Bottom Axis

(B) Centroidal Axis

(C) Topmost Axis

(D) Radius of gyration

106. The bending moment diagram for a cantilever beam carrying uniformly distributed load will be a

(A) Rectangle

(B) Triangle

(C) Parabola

(D) Hyperbola

107. The maximum value of the stress concentration factor in an infinite plate with a circular hole under uniaxal tension is

(A) 2

(B) 3

(C) 4

(D) 5

108. The endurance limit of a material can be improved by

(A) Polishing

(B) Heat Treatment

(C) Knurling

(D) Residual Stresses

109. Preferred numbers are arranged

(A) Arithmetically

(B) In Geometric series

(C) Logarithmically

(D) Randomly

110. The basic hole is one whose

(A) Lower deviation is zero

(B) Upper deviation is zero

(C) Lower deviation is positive

(D) Upper deviation is negative

111. The maximum section thickness for grey sand casting is

(A) 1 mm

(B) 2 mm

(C) 3 mm

(D) 5 mm

112. When a part is cast, it should always be subjected to

(A) Tension

(B) Compression

(C) Torsion

(D) Rotation

113. The average intensity of light level for normal working conditions should be

(A) Below 100 lux

(B) 100 lux

(C) 160 lux

(D) 250 lux

114. The deflection of helical spring is inversely proportional to

(A) wire diameter

(B) $(\text{wire diameter})^2$

(C) $(\text{wire diameter})^3$

(D) $(\text{wire diameter})^4$

115. For square and ground end condition of helical springs, the number of inactive turns are

(A) 1
(B) 2
(C) 0
(D) 3

116. The difference between tensions on the tight and slack sides of a belt drive is 3000 N. If the belt speed is 15 m/s, the transmitted power in kW is

(A) 90
(B) 22.5
(C) 45
(D) 100

117. For the spur gear, the product of the circular pitch and diametral pitch is equal to

(A) unity
(B) $\frac{1}{\pi}$
(C) π
(D) module

118. Interference is inherently absent in the following type of gears

(A) Involute
(B) Cycloidal
(C) Stub
(D) Hypocycloidal

119. Which of the following bearings can take up large thrust loads?

(A) Deep groove ball bearing
(B) Filling notch ball bearing
(C) Self aligning bearing
(D) Angular contact bearing

120. In four bar mechanism, the mechanical advantage is maximum when velocity ratio is

(A) Maximum
(B) Minimum
(C) 1
(D) 1/2

Space For Rough Work