1. Which of the following process s/ operation is carried out primarily to obtain surface finish?

a) Rolling   b) piercing   c) honing   d)hobbling

2. In a turning operation if both the feed and the nose radius are doubled, the surface roughness value will

a) Decrease by 50%   b) increase by 300%

c) Increase by 100%   d) remain unaffected

3. Crowning of gears is done

a) To increase the pressure angle   b) for surface finish

c) For increasing the strength of teeth   d) only in case of high speed gears

4. Lip clearance on drills is usually

a) 8°-12°   b) 24°-40°   c) 118° d) 120°-135°

5. The tailstock set over to turn a taper of 1 in 12 on piece of 84 length will be

a) 1.5 mm   b) 3.5mm   c) 5mm d) 7.5mm

6. A step cone pulley is provided on a lathe to

a) Reduce power consumption   b) turn the tapers   c) change the spindle speed

d) Reverse the direction of spindle

7. Wringling fit is common in

a) Roller bearings   b) bush bearings   c) piston pins   d) slip gauges

8. In a blanking operation the clearance provided is

a) 50% on punch & 50% on die   b)on die   c) on punch

d) on die or punch depending upon the designer's choice

9. Shell Reamers ore mounted on

a) Tool holders   b) armour plates   c) arbour   d) Shanks

10. When supported on three points out of the 12 degrees of freedom, the number of degrees of freedom arrested in a body

a) 3   b) 4   c) 5   d) 6

11. The pressure P of an ideal gas and its mean kinetic energy E per unit   volume are related by the relation

a)P=E/2   b) P=3E/2   c) P=2E/3   d) P=E/3

12. Consider the following properties of vapour:

1. Pressure   2.Temperature

3. Dryness fraction   4. Specific volume

Which of these two properties alone are not sufficient to specify the condition of a vapour

a)1 and 2   b) 1 and 3   c) 2 and 3   d) 3 and 4

13. A system undergoes a state change from 1 to 2. According to the   second law of thermodynamics for the process to be feasible, the entropy change, S_2-S_1 of the system

a)is positive or zero   b) is negative or zero

 c) is zero d) can be positive , negative or zero

14.In   the   van   der   wall's   equation $(p+a/v^2)(V-b)=RT$ the   greater   value   of constant's

a)closer the gas is to the ideal conditions   b)lesser are the forces of cohesion

c) Easier is to liquefy the gas   d) Higher is the density of the gas

15. Number of cycle in the rankine cycle is

 a)3   b) 4   c) 5   d) 6

16. Sensible heat factor is defined as the ratio of

 a)Latent heat to sensible heat   b)Sensible heat to latent heat c)Latent heat to total heat

 d)Sensible heat to total heat

17. Calculate the enthalpy of 3kg of fluid that occupies a volume of $1.5m^3$, if   the internal energy is 3.5 MJoules /kg and the pressure is 0.3 MN/m^2

  a)10.95 KJ   b) 10.95 J   c) 10.95 MJ   d) 109 MJ

18. In a cycle heat engine operating between a source temperature of $600°$ C and a sink temperature of 20° C , the least rate of heat rejection per kW net output of the engine is

 a)0.450kW   b) 0.505 kW   c) 0.460 KW   d) 0.460W

19.A closed system receives 60Kj heat but its internal energy decreases by 30kJ. Then the work done by the system is

 a)90 kJ   b) 90J   c) -90 kJ   d) -30kJ

20. A carnot engine rejects 30 % of absorbed heat to a sink at 30 °C . The temperature of the heat source is

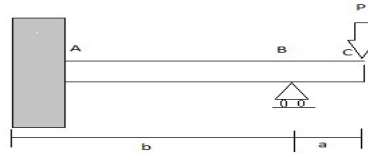a)100° C   b) 100K   c) 737°C   d) 768° C

21.If the shear force at a section of a beam under bending is equal to zero then the bending moment at the section is

a) Zero   b) maximum

c) minimum   d) minimum or maximum

22. The magnitude of the bending moment at the fixed support of the beam is equal to

    a) P.a   b) P.a/2   c) P.b   d) P.(a+b)

23. If the value of Poisson's ratio is zero then it means that

   a) The material is rigid   b) the material is perfectly plastic

   c) There is no longitudinal strain in the material

   d) The longitudinal strain in the material is infinite

24. A thick cylinder is subjected to an internal pressure of 60 MPa. If the hoop stress on the outer surface is 150 MPa then the hoop stress on the internal surface is

 a) 105 MPa   b) 180 MPa   c) 210 MPa   d) 135 MPa

25. The point of contraflexure is a point where:

 a) Shear force changes sign   b) Bending moment changes sign

 c) shear force is maximum   d) Bending moment is maximum

26. Autofrettage is a method of

   a) Joining thick cylinders

   b) Reliving stresses from thick cylinders

   c) Prestressing thick cylinders

   d) Increasing the life off the thick cylinders

27. The linear relation between the stress and strain of a material is valid until

   a) Fracture stress   b) Elastic limit

   c) Ultimate stress   d) Proportional limit

28. Hooke's law holds good upto

   a) Yield point   b) limit of proportionality

   c) Breaking point   d) Elastic limit

29. Euler's formula holds good only for

a) Short columns   b) Long columns

c) Both short and long column   d) weak column

30. In the fillet weld the weakest section is the

a) Smaller side of the fillet

b) Throat of the fillet

c) Side perpendicular to force

d) Side parallel to force

31. In abrasive jet machining, as the distance between the nozzle tip and the work surface increases, the material removal rate

a)increases continuously.   b) decreases continuously.

c)decreases, becomes stable and then increases.

d)increases, becomes stable and then decreases.

32. Match the following:

NC code	Definition
P. M05	1. Absolute coordinate system
Q. G01	2. Dwell
R. G04	3. Spindle stop
S. G09	4. Linear interpolation

a) P-2, Q-3, R-4, S-1   b) P-3, Q-4, R-1, S-2

c) P-3, Q-4, R-2, S-1   d) P-4, Q-3, R-2, S-1

33. When the temperature of a solid metal increases,

a) strength of the metal decreases but ductility increases

b) both strength and ductility of the metal decreases

c) both strength and ductility of the metal increases

d) strength of the metal increases but ductility decreases

34. During the execution of a CNC part program block
NO20 GO2 X45.0 Y25.0 R5.0 the type of tool motion will be

a) Circular Interpolation – clockwise

b) circular Interpolation – counter clockwise

c) linear Interpolation

d) rapid feed

35. The values of shear angle and shear strain, respectively, are

a) 30.3c and 1.98   b) 30.3c and 4.23   c) 40.2c and 2.97   d) 40.2c and 1.65   36. The percentage of carbon in gray cast iron is in the range of

a) 0.25 to 0.75 percent   b) 1.25 to 1.75 percent

c) 3 to 4 percent   d) 8 to 10 percent

37. The dimensional limits on a shaft of $25h7$ are

a) 25.000, 25.021 mm   b)25.000, 24.979 mm

c) 25.000, 25.007 mm   d) 25.000, 24.993 mm

38. Which of the following arc welding processes does not use consumable electrodes?
 a) GMAW   b) GTAW   c) Submerged Arc Welding   d) None of these

39. A built-up-edge is formed while machining
 a) ductile materials at high speed   b) ductile materials at low speed
 c) brittle materials at high speed   d) brittle materials at low speed

40. In an NC machining operation, the tool has to be moved from point (5, 4) to point (7, 2) along a circular path with centre at (5, 2). Before starting the operation, the tool is at (5, 4). The correct G and N codes for this motion are
a) $N010$ $GO3$ $X7.0$ $Y2.0$ $I5.0$ $J2.0$ b) $N010$ $GO2$ $X7.0$ $Y2.0$ $I5.0$ $J2.0$
c) $N010$ $GO1$ $X7.0$ $Y2.0$ $I5.0$ $J2.0$ d) $N010$ GOO $X7.0$ $Y2.0$ $I5.0$ $J2.0$

41.A solid circular shaft needs to be designed to transmit a torque of 50 Nm. Ifthe allowable shear stress of the material is 140 MPa, assuming a factor of
safety of 2, the minimum allowable design diameter is mm is
a) 8   b) 16   c) 24   d) 32

42.A 20c full depth involute spur pinion of 4 mm module and 21 teeth is to
transmit 15 kW at 960 rpm. Its face width is 25mm.The tangential force transmitted (in N) is
a) 3552   b) 2611   c) 1776   d) 1305

43.A clutch has outer and inner diameters 100 mm and 40 mm respectively.
Assuming a uniform pressure of 2MPa and coefficient of friction of liner
material is 0.4, the torque carrying capacity of the clutch is
a) 148 N m   b) 196 N m   c) 372 N m   d) 490 N m

44.A ball bearing operating at a load F has 8000 hours of life. The life of the
bearing, in hours, when the load is doubled to $2F$ is
a) 8000   b) 6000   c) 4000   d) 1000

45.A gear set has a pinion with 20 teeth and a gear with 40 teeth. The pinion
runs at 30 rev/s and transmits a power of 20 kW. The teeth are on the 20c
full-depth system and have a module of 5mm. The length of the line of
action is 19 mm.The center distance for the above gear set in mm is
a) 140   b) 150   c) 160   d) 170

46.Twenty degree full depth involute profiled 19 tooth pinion and 37 tooth gear
are in mesh. If the module is 5 mm, the centre distance between the gear
pair will be
a) 140 mm   b) 150 mm   c) 280 mm   d) 300 mm

47.A 60 mm long and 6mm thick fillet weld carries a steady load of 15 kN
along the weld. The shear strength of the weld material is equal to 200 MPa. The factor of safety is
a) 2.4   b) 3.4   c) 4.8   d) 6.8

48.Which one of the following is criterion in the design of hydrodynamic journal bearings ?
a) Sommerfeld number   b) Rating life

c) Specific dynamic capacity   d) Rotation factor

49.The S-N curve for steel becomes asymptotic nearly at
a) 10^3 cycles   b) 10^4 cycles   c) 10^6 cycles   d) 10^9 cycles

50.In a band brake the ratio of tight side band tension to the tension on the
slack side is 3. If the angle of overlap of band on the drum is 180c, the
Coefficient of friction required between drum and the band is
a) 0.20   b) 0.25   c) 0.30   d) 0.35

51. The following are the data for two crossed helical gears used for speed reduction:

Gear I: Pitch circle diameter in the plane of rotation 80 mm and helix angle 30c. Gear II: Pitch circle diameter in the plane of rotation 120 mm and helix angle 22.5c. If the input speed is 1440 rpm, the output speed in rpm is

 a) 1200   b) 900   c) 875   d) 720

52. There are two points P and Q on a planar rigid body. The relative velocity between the two points

    a) Should always be along PQ   b) can be oriented along any direction

    c) Should always be perpendicular to PQ   d) should be along QP when   the body undergoes pure translation.

53. Tooth interference in an external involute spur gear pair can be reduced by

   a) Decreasing center distance between gear pair   b) decreasing module

   c) Decreasing pressure angle   d) increasing number of gear teeth

54. An automotive engine weighing 240kg is supported on four springs with linear characteristics. Each of the front two springs have a stiffness of 16 /MN m while the stiffness of each rear spring is 32/MNm. The engine speed (in rpm), at which resonance is likely to occur, is

    a) 6040   b) 3020   c) 1424   d) 955

55. A vehicle suspension system consists of a spring and a damper. The stiffness of the spring   is 3.6 /kN m and the damping constant of the damper is 400 /Ns m. If the mass is 50kg, then the damping factor (d) and damped natural frequency () fn, respectively, are

    a) 0.471 and 1.19 Hz   b) 0.471 and 7.48 Hz

    c) 0.666 and 1.35 Hz   d) 0.666 and 8.50 Hz

56. The number of inversion for a slider crank mechanism is

    a) 6   b) 5   c) 4   d) 3

57. The number of degrees of freedom of a planar linkage with 8 links and 9 simple revolute joints is

    a) 1   b) 2   c) 3   d) 4

58. The mechanism used in a shaping machine is

    a) a closed 4-bar chain having 4 revolute pairs

b) a closed 6-bar chain having 6 revolute pairs

c) a closed 4-bar chain having 2 revolute and 2 sliding pairs

d) an inversion of the single slider-crank chain

59. When a cylinder is located in a Vee-block, the number of degrees of freedom which are arrested is

    a) 2   b) 4   c) 7   d) 8

60. If the length of the cantilever beam is halved, the natural frequency of the mass M at the end of this cantilever beam of negligible mass is increased by a factor of

    a) 2   b) 4   c) 8   d) 8

61. If a mass of moist air in an airtight vessel is heated to a higher temperature, then
a) specific humidity of the air increases
b) specific humidity of the air decreases
c) relative humidity of the air increases
d) relative humidity of the air decreases

62. A moist air sample has dry bulb temperature of 30cC and specific humidity of 11.5 g water vapour per kg dry air. Assume molecular weight of air as 28.93. If the saturation vapour pressure of water at 30cC is 4.24 kPa and the total pressure is 90 kPa, then the relative humidity (in %) of air sample is
a) 50.5 b) 38.5   c) 56.5 d) 68.5

63. Dew point temperature is the temperature at which condensation begins when the air is cooled at constant
a) volume   b) entropy   c) pressure   d) enthalpy

64. For a typical sample of ambient air (at 35cC, 75% relative humidity and standard atmosphere pressure), the amount of moisture in kg per kg of dry air will be approximately
a) 0.002   b) 0.027   c) 0.25   d) 0.75

65. Water at 42cC is sprayed into a stream of air at atmospheric pressure, dry bulb temperature of 40cC and a wet bulb temperature of 20cC. The air leaving the spray humidifier is not saturated. Which of the following statements is true ?
a) Air gets cooled and humidified
b) Air gets heated and humidified
c) Air gets heated and dehumidified
d) Air gets cooled and dehumidified

66. In the window air conditioner, the expansion device used is
a) capillary tube   b) thermostatic expansion valve
c) automatic expansion valve   d) float valve

67.During the chemical dehumidification process of air

a) dry bulb temperature and specific humidity decreases

b) dry bulb temperature increases and specific humidity decreases

c) dry bulb temperature decreases and specific humidity increases

d) dry bulb temperature and specific humidity increases

68. Environment friendly refrigerant R134 is used in the new generation domestic refrigerators. Its chemical formula is

a) CHClF2   b) C2Cl3F3   c) C2Cl2F4   d) C2H2F4

69. An industrial heat pump operates between the temperatures of 27cC and -13cC. The rates of heat addition and heat rejection are 750 W and 1000W, respectively. The COP for the heat pump is

a) 7.5   b) 6.5   c) 4.0   d) 3.0

70.For air with a relative humidity of 80%

a) the dry bulb temperature is less than the wet bulb temperature

b) the dew point temperature is less than wet bulb temperature

c) the dew point and wet bulb temperature are equal

d) the dry bulb and dew point temperature are equal

71. The time variation of the position of a particle in rectilinear motion is given by $x = 2t^3 + t^2 + 2t$. If v is the velocity and a is the acceleration of the particle in consistent units, the motion started with

a) $v = 0, a = 0$ b) $v = 0, a = 2$ c) $v = 2, a = 0$ d) $v = 2, a = 2$

72. A simple pendulum of length of 5 m, with a bob of mass 1 kg, is in simple harmonic motion. As it passes through its mean position, the bob has a speed of 5 m/s. The net force on the bob at the mean position is

a) zero   b) 2.5 N   c) 5 N   d) 25 N

73. The figure shows a pin-jointed plane truss loaded at the point M by hanging a mass of 100 kg. The member LN of the truss is subjected to a load of

a) 0 Newton   b) 490 Newtons in compression

c) 981 Newtons in compression   d) 981 Newtons in tension

74. A truss consists of horizontal members (AC,CD, DB and EF) and vertical members (CE and DF) having length l each. The members AE, DE and BF are inclined at 45c to the horizontal. For the uniformly distributed load "p" per unit length on the member EF of the truss shown in figure given below,

the force in the member CD is

                a)PL/2   b)PL   c)0   d)2PL/3

75.The area moment of inertia of a square of size 1 unit about its diagonal is

$$\frac{1}{3} \qquad \frac{1}{4} \qquad \frac{1}{12} \qquad \frac{1}{6}$$
a)   b)   c)   d)

76. The coefficient of restitution of a perfectly plastic impact is
a) 0   b) 1   c) 2   d) 3

77. A block weighing 981N is resting on a horizontal surface. The coefficient of friction between the block and the horizontal surface is $m = 0.2$. A vertical cable attached to the block provides partial support as shown. A man can pull horizontally with a force of 100 N. What will be the tension, T (in N) in the cable if the man is just able to move the block to the right ?

a) 176.2   b) 196.0   c) 481.0   d) 981.0

78. A straight rod length $L(t)$, hinged at one end freely extensible at the other end, rotates through an angle $q(t)$ about the hinge. At time t, $L(t) = 1$ m, $Lo(t) = 1$ m/ s, $q(t) = p4$ rad and $qo(t) = 1$ rad/ s. The magnitude of the velocity at the other end of the rod is

a) 1 m/s   b)   2 m/ s   c) 3 m/ s   d) 2 m/ s

79. During inelastic collision of two particles, which one of the following is conserved ?

a) Total linear momentum only   b) Total kinetic energy only

c) Both linear momentum and kinetic energy   d) Neither linear momentum nor kinetic energy

80. A 1 kg block is resting on a surface with coefficient of friction $m = 0.1$. A force of 0.8 N is applied to the block as shown in the figure. The friction force is

a) 0   b) 0.8 N   c) 0.98 N   d) 1.2 N

81. When in equilibrium, fluids can't sustain …………. Forces.

a) Inertia   b) shear   c) tensile   d) buoyant

82. If V1 and V2 be velocity at inlet and outlet, then loss of head due to

Sudden enlargement is proportional to…………

a) [v1-v2]   b) v2-v1   c) $[(v1-v2)^2]$ d) $[(v1-v2)^3]s$

83. Viscosity had dimension of

a) FT^2/L b) F/LT^2 c) M/LT^2 d) M/LT

84. The viscosity of

   a) liquids increases with temperature

   b) gases increases with temperature

   c) fluids decreases with temperature

   d) fluids increases with temperature

85. Shear stress develops on a fluid element, if

   a) the fluid is at rest

   b) the fluid container is subject to uniform linear acceleration

   c) the fluid is inviscid

   d) the fluid is viscous and the flow is non-uniform

86. Which principle doesn't apply to the balloon lifting in air

   a) Archemedes principle   b) Principle of buoyancy

   c) Law of gravitation   d) Continuity equation

87. For $\mu=0.06$ poise ,$e=0.9$ gm $/cm^3$,kinematic viscosity in stokes is

   a) 0.04   b) 0.054   c) 0.067   d) 0.4

88. A real fluid is any fluid which

   a) has surface tension and is incompressible

   b) has zero shear stress

   c) has constant viscosity and density

   d) has viscosity

89. Which of the following equations is applicable to a Newtonian fluid

   a) F=ma   b) $\tau=\mu\ du/dy$ c) $F\Delta t= \Delta\ mv$ d) $\tau=\mu d^2u/dy^2$

90. Capillarity is due to

      a) Cohesion

      b) Cohesion and adhesion

      c) molecular structure and gravity

      d) viscous force and inertia

91. For an opaque surface, the absorptivity (a), transmissivity (t) and reflectivity (r) are related by the equation :
a) $a + r = t$ b) $r + a + t = 0$ c) $a + r = 1$ d) $a + r = 0$

92. Which one of the following configurations has the highest fin effectiveness?
a) Thin, closely spaced fins   b) Thin, widely spaced fins
c) Thick, widely spaced fins   d) Thick, closely spaced fins

93. In a condenser of a power plant, the steam condenses at a temperatures of 60cC. The cooling water enters at 30cC and leaves at 45cC. The logarithmic mean temperature difference (LMTD) of the condenser is
a) 16.2cC   b) 21.6cC   c) 30cC   d) 37.5cC

94. In a counter flow heat exchanger, hot fluid enters at 60cC and cold fluid leaves at 30cC. Mass flow rate of the fluid is 1 kg/s and that of the cold fluid is 2 kg/s. Specific heat of the hot fluid is 10 kJ/kgK and that of the cold fluid is 5 kJ/kgK. The Log Mean Temperature Difference (LMTD) for the heat exchanger in cC is
a) 15   b) 30   c) 35   d) 45

95. A 100W electric bulb was switched on in a 2.5m#3m#3m size thermally insulated room having a temperature of 20cC. The room temperature at the end of 24 hours will be
a) 321cC   b) 341cC   c) 450cC   d) 470cC

96. A solid cylinder (surface 2) is located at the centre of a hollow sphere (surface 1). The diameter of the sphere is 1m, while the cylinder has a diameter and length of 0.5m each. The radiation configuration factor $F11$ is
a) 0.375   b) 0.625   c) 0.75   d) 1

97. Hot oil is cooled from 80 to 50cC in an oil cooler which uses air as the coolant. The air temperature rises from 30 to 40cC. The designer uses a LMTD value of 26cC. The type of heat exchange is
a) parallel flow   b) double pipe   c) counter flow   d) cross flow

98. A stainless steel tube $^\wedge ks$ = 19W/m Kh of 2 cm ID and 5 cm OD is insulated with 3 cm thick asbestos $^\wedge ka$ = 0.2W/m Kh. If the temperature difference between the innermost and outermost surfaces is 600cC, the heat transfer rate per unit length is
a) 0.94 W/m   b) 9.44 W/m   c) 944.72 W/m   d) 9447.21 W/m

99. In a counter flow heat exchanger, for the hot fluid the heat capacity = 2 kJ/kgK, mass flow rate = 5 kg/s, inlet temperature = 150cC, outlet temperature = 100cC. For the cold fluid, heat capacity = 4 kJ/kgK, mass flow rate = 10 kg/s, inlet temperature = 20cC. Neglecting heat transfer to the surroundings, the outlet temperature of the cold fluid in cC is
a) 7.5   b) 32.5   c) 45.5   d) 70.0

100. In descending order of magnitude, the thermal conductivity of (a) pure iron, (b) liquid water, (c) saturated water vapour and (d) aluminum can be arranged as
a) abcd   b) bcad   c) dabc   d) dcba

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