SRMGEET 2015 for M.Tech

Model Question Paper

Civil (Section Code-01)

1. If $3x + 2y + z = 0,\ x + 4y + z = 0,\ 2x + y + 4z = 0$ be a system of equations, then
   a) It is incomsistent
   b) It has only trivial solution $x = 0, y = 0, z = 0$
   c) It can be reduced to a single equation and so a solution does not exist
   d) determinant of the matrix of coefficients is Zero

2. If 7 and 2 are two roots of the follwing equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then its third root is
   a) -9 b) 14 c) $\frac{1}{2}$ d) 2

3. The solution of $y'' = x + e^x,\ x \in R,\ y(0) = 1,\ y'(0) = 4\ is$
   a) $y = \frac{1}{2}x^2 + x + e^x$ b) $y = \frac{x^3}{3} + \frac{x^2}{2} + e^x$
   c) $y = \frac{1}{6}x^3 + 3x + e^x$ d) $y = x^3 + x^2 + x + e^x$

4. The area of the region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is
   a) 3π b) 4π c) 6π d) 36π

5. In an experiment the success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is
   a) $\frac{64}{729}$ c) $\frac{192}{729}$ c) $\frac{496}{729}$ d) $\frac{240}{729}$

6. Directional derivative of $f = xyz$ at the point (1,-1,-2) in the direction of the vector $2\bar{\imath} - 2\bar{\jmath} + \bar{k}$ is
   a) $\frac{7}{6}$ b) $\frac{7}{3}$ c) 1 d) $\frac{11}{6}$

7. If $u = x^2 + y^2 + z^2$ and $\bar{v} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ then div $(u\bar{v})$ is equal to
   a) 5*u* b) 6*u* c) 0 d) -*u*

8. The particular Integral of the differential equation $(D^3 - D)y = e^x + e^{-x}, D = \frac{d}{dx}$ is
   a) $\frac{1}{2}(e^x + e^{-x})$ b) $\frac{1}{2}x(e^x + e^{-x})$ c) $\frac{1}{2}x^2(e^x + e^{-x})$ d) $\frac{1}{2}x^2(e^x - e^{-x})$

9. If $2x - x^2 + ay^2$ is to be harmonic, then *a* should be
   a) 1 b) 2 c) 3 d) 0

10. Which of the following equation is parabolic ?
a) $fxy - fx = 0$ b) $fxx + 2fxy + fyy = 0$ c) $fxx + 2fxy + 4fyy = 0$
d) none

11. The specific gravity of sandstone is
a) 1.1 to 1.8 b) 1.8 to 2.65 c) 2.65 to 2.95 d) 2.95 to 3.4

12. The final setting time of ordinary cement should not be more than
a) 2 hours b) 4 hours c) 8 hours d) 10 hours

13. The construction of a temporary structure required to support an unsafe structure is called
a) underpinning b) scaffolding c) shoring d) jacking

14. The minimum depth of foundation for the load bearing wall of a building is restricted to
a) 600mm b) 700mm c) 800mm d) 900mm

15. A queen post truss is commonly use for spans
a) upto 3.5m b) from 3.5 to 5m c) from 5 to 9 m d) from 9 to 14 m

16. Zero cement concrete is
a) OPC concrete b) rapid hardening concrete
c) Geo polymer concrete d) Health monitoring concrete

17. The compound responsible for initial setting of cement is
a) C_3A b) C_2S c) C_3S d) C_4AF

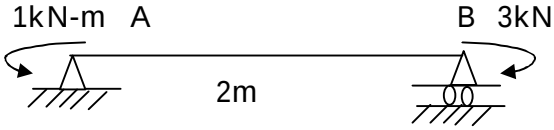
18. Born Again concrete refers to
a) High strength concrete b) High performance concrete
c) Low heat concrete d) Recycled concrete

19. Minimum grade of concrete recommended for R.C works is
a) M30 b) M20 c) M15 d) M25

20. The object of compaction is to
a) eradicate air holes
b) give maximum density
c) ensure intimate contact between the concrete and the surface of reinforcement
d) all of the above

21. Under normal circumstances the beam soffits may be removed after
a) 2 days b) 7 days c) 14 days d) 21 days

22. A simply supported beam AB of span 2m is loaded as shown in the figure. Which one of the following pairs corresponds to SFD and BMD for the beam?



a) 2kN (+) 2kN SFD
2kN-m (-) 3kN-m BMD

b) 2kN (-) 2kN SFD
2kN-m (-) 3kN-m BMD

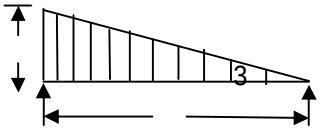
c) 1kN (-) 1kN SFD
2kN-m (-) 3kN-m BMD

d) 1kN (-) 1kN SFD
1kN-m (-) 2kN-m BMD

23. A continuous RC beam spans six span segments , each supporting a monolithic Reinforced concrete slab . The beam will best be designed
a) as a rectangular one throughout its span
b) as a tee- beam throughout its span
c) as a rectangular beam for span moments and tee-beam for support moments
d) as a tee-beam for span moments and rectangular beam for support moments

24. In a real beam at an end , the boundary condition of zero slope and zero vertical displacements exists. In the corresponding conjugate beam , the boundary conditions at this end will be:
a) shear force =0 , Bending moment =0 b) Slope =0, vertical displacement =0
c) slope=0 , bending moment=0 d) shear force =0 , vertical displacement=0

25. For the beam shown in the Figure the shear force at B is equal to

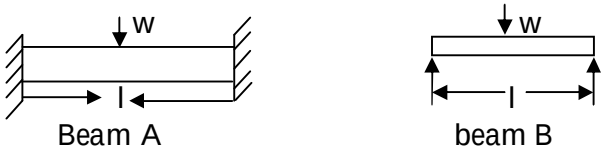


a) wl / 6 b) wl / 3 c) wl d) 2wl / 3

26. The point of contra flexure is a point where
a) shear force changes sign b) bending moment changes sign
c) shear force is maximum d) bending moment Is maximum

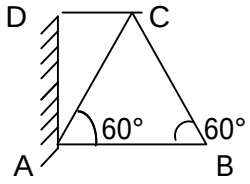
27. A square beam and a circular beam have the same length, same allowable stress and the same bending moment. The ratio of weights of the square beam to the circular beam is
a) ½ b) 1 c)1 / 1.12 d) 1 / √2

28. Two beams 'A ' and 'B' carrying a central point load W are shown in fig.



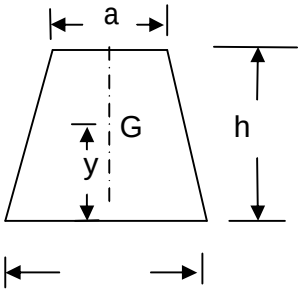
The central deflection of beam 'A' will be _____ as compared to beam 'B' is
a) One eighth b) one fourth c) one half d) double

29. In a framed structure as shown in fig, the force in the member BC is



a) W / √3(compression) b) W / √3(tension)
c) 2W / √3(compression d) 2W / √3(tension)

30. The centre of gravity of a trapezium with parallel sides a and b lies at a distance of y from the base b, as shown in the figure the value of y is



b

a) h (2a+b)/(a+b) b) h/2 (2a+b)/(a+b) c) h/3 (2a+b)/(a+b) d) h/3 (a+b)/(2a+b)

31. The factor of safety due to overturning of the retaining wall is generally takes as
a) 2 b) 4 c) 6 d) 8

32. The thickness of flat slab in no case should be less than
a) 125mm b) 200mm c) 275mm d) 35mm

33. The efficiency of a riveted joint is equal to
a) least strength of riveted joint / strength of solid plate b) greatest strength of riveted joint / strength of solid plate
c) least strength of solid plate / least strength of riveted joint d) least strength of solid plate / greatest strength of riveted joint

34. The formula which takes into account any initial crookedness of the column and imperfectness of axial loading is
a) Perry-Robertson formula b) Euler's formula
b) c) Secant formula d) Rankine formula

35. The beam resting on purlins are known as
a) spandrel beams b) rafters c) trimmers d) stringers

36. Maximum percentage of reinforcement in a RC column under practice is
a) 0.8 b) 4.0 c) 6.0 d) 5.0

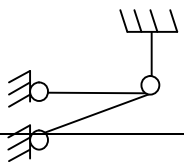
37. The modulus of rupture of a concrete of grade M25 is
a) 1.25 Mpa b) 2.5Mpa c) 3.5 Mpa d) 3.2 Mpa

38. A R.C column of size 300mm x 400mm has an unsupported height of 3.9m. It is a
a) medium column b) long column
c) short column d) axially loaded column

39. The Poisson's ratio of materials cannot exceed
a) 0.3 b) 0.33 c) 0.15 d) 0.5

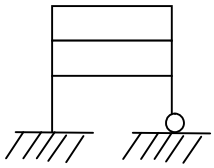
40. Application of theorem of minimum potential energy establishes
a) compatibility b) equilibrium
c) both d) not related to both

41. The degree of static indeterminacy of the truss shown is



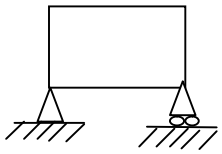
a) one b) zero c) three d) two

42. The degree of kinematic indeterminacy of frame shown is



a) 10 b) 9 c) 3 d)8

43. The stiffness matrix of the given symmetrical box girder is of order

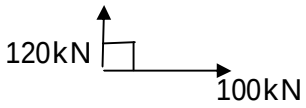


a) 5 x5 b) 4 x 4 c) 3 x3 d)2x2

44. The basic value of span to 'd' of a cantilever beam is
a) 26 b) 35 c) 7 d)20

45. In case steel without a definite yield point, the yield stress is defined as a proof stress corresponding to ___ % Strain
a) 1.0 b) 1.2 c) 2.0 d) 1.5

46. The resultant force of the forces shown is



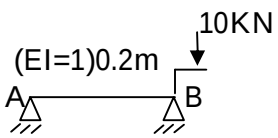
a) 220kN b) 20kN c) 165kN d)156.2kN

47. The ratio maximum displacements of a cantilever beam with point load 'w' at tip and udl w/l , l being the span is
a) 3:8 b) 3:4 c)8:3 d)1:2

48. For a rectangular section the maximum shear stress is ____ times the average stress
a)2/3 b)2 c) 3/2 d)3/4

49. In conjugate beam method, the free end of real beam is considered as
a)Hinged b)Roller c)Fixed d)Free

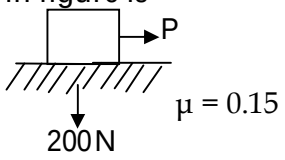
50. The rotations at ends (A,B) of the beam shown are (EI=1)0.2m



6m,EI

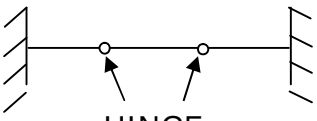
a)2,4 b)4,2 c)zero d)1,2

51. The force 'P' required to pull the blow shown in figure is



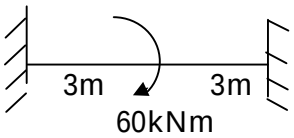
a)30N b)20N c)3.05N d)20.39N

52. The static indeterminacy of the given beam is



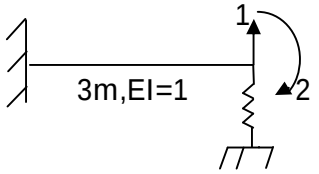
a)3 b)2 c)1 d)zero

53. The fixed end moment for the beam shown



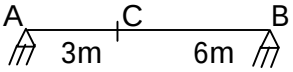
a)20kNm b)180kNm c)30 kNm d)15 kNm

54. The flexibility coefficient a_{11} for the beam shown in figure is (given spring stiffness is 10 unit)



a)9 b)19 c)9.1 d)1.9

55. The ordinate of ILD for the reactions at 'A' when load is at C is



a)1/6 b)1/3 c)1/9 d)2/3

56. Focal length of grider is related to
a)reversal of stresses b)bay length c)udl d)point load

57. When a point carries hydrostatic type of stresses Mohr's circle reduces to
a)triangle b)line c)point d)rectangle

58. Failure theory based on Maximum principal strain is generally adopted to

a)ductile materials b)viscous materials c)elastic material d)brittle material

59. If the average daily water consumption of a city is 24000 cu.m, the peak hourly demand of the maximum day of course will be :
a) 1000 cu m/hr b) 1500 cu m/hr
c) 1800 cu m/hr d) 2700 cu m/hr:

60. The water treatment units may 'be designed, including 100% reserves, for water demand equal to :
a) average daily b) twice of (a) c) maximum daily d) twice of (c)

61. The suitable method for forecasting population for an old developed large city, is :
a) arithmetic mean method
b) geometric mean method
c) comparative graphical method
d) none of these.

62. The average domestic water consumption per capita per day for an Indian city, as per IS 1172- 1963, may be taken as :
a)135 l/c/d b) 210 l/c/d c) 240 l/c/d d) 270 l/c/d)

63. Rate of flow from 'a well per unit of drawdown known as its:.'
a) specific yield b) specific capacity c) field capacity d) none of these.

64. The most widely used type of a tube well in India is :
a) a cavity well b) a strainer well c) a dug well d) a ranney well.

65. The types of pumps used in tubewells are :
a) Submergible pumps b) centrifugal pumps
c) turbine type pumps d) all of these

66. The efficiency of the pump used for lifting water from a tube well may be assumed to be
a) 30% b) 65% c)80% d) 90%

67. Latitude of a place is the angular distance from,
a) Greenwich to the place b) equator to the poles
c) equator to the nearer pole d) none of these

68. International date line is located along
a) standard meridian b) Greenwich meridian
c) equator d) 180 degree 1ongitude

69. A nautical mile is
a) one minute arc of the great circle joining two points
b) one minute arc of the longitude
c) 6080 ft

d)all the above.

70. The great circle along which the Sun appears to trace on the celestial sphere with earth as centre during the year, is called
a) equator b) celestial equator c) ecliptic d) none of these

71. The great circle which passes through the zenith, nadir and the poles is known as
a) meridian. b) vertical circle c) prime veriical d) none of these

72. The angle between the observer's meridian and declination circle of a heavenly body, is known as
a) hour angle b) azimuth c) right ascension d) declination

73. The most convenient co-ordinate system for specifying the relative positions of heavenly bodies on celestial sphere is
a) altitude and azimuth system
b) declination and hour angle system.
c) declination and right ascension system
d) declination and altitude system

74. Circum Polar stars
a) rotate round the north pole b) rotate round the celestial pole
c) remain always above the horizon d) are seldom seen near the pole star

75. For any star to be a circumpolar star, its
a) declination must be 0"
b) declination must be 90"
c) distance from the pole must be less than the latitude of the observer
d) no angle must be 180 degree .

76. If a star whose declination is 600 N culminates at zenith, its altitude at the lower culmination, is
a) 10° b) 20° c) 30° d)40°

77. Chemically marble is a
a) calcareous rock b) silicious rock
c) argillaceous rock d) none of the above.

78. Shingle is
a) decomposed laterite b) crushed granite
c) water bound pebbles d) air weathered rock

79. Soundness test of cement determines
a) quality of free lime b) ultimate strength
c) durability d) initial strength

80. Seasoning of the timber is essential to remove

a) knots from timber b) sap from timber
c) twisted fibre from d) roughness of timber

81. A well seasoned timber may contain moisture up to
a) 4 to 6% b) 6 to 8% c) 8 to 10% d) 10 to 12%

82. The specific weight of sea water is _____ that of pure water.
a) same as b) less than
c) more than d) some times less and some times more

83. The mercury does not wet the glass. This is due to the property of the liquid known as
a) Cohesion b) adhesion
c) viscosity d) Surface tension

84. Falling drops of water become spheres due to the property of
a) Surface tension of water b) Compressibility of water
c) Capillary of water d) Viscosity of water

85. The pressure measured with the help of a pressure gauge is called
a) Atmospheric pressure b) gauge pressure
c) Absolute pressure d) mean pressure

86. The absolute pressure is equal to
a)gauge pressure + atmospheric pressure
b)gauge pressure - atmospheric pressure
c)atmospheric pressure - gauge pressure
d)gauge pressure - vacuum pressure

87. A manometer is used to measure
a) low pressure b) moderate pressure
c) high pressure d) atmospheric pressure

88. A vertical wall is subjected to a pressure due to one kind of liquid, on one of its sides. Which of the following statement is correct?
a) The pressure on the wall at the liquid level is minimum.
b) The pressure on the bottom of the wall is maximum.
c) The pressure on the wall at the liquid level is zero,and on the bottom of the wall is maximum.
d) The pressure on the bottom of the wall is zero.

89. The stability of a dam is checked for
a)tension at the base b)overturning of the wall or dam
c) sliding of the wall or dam d)all of the above

90. When a body is immersed wholly or partially in a liquid, it is lifted up by a force equal to the weight of liquid displaced by the body. This statement is called,
a) Pascal's Law b)Archimede's principle
c) Principle of floatation d)Bernoulli's theorem.

91. The buoyancy depends upon the
a) pressure with which the liquid is displaced
b) weight of the liquid displaced
c) viscosity of the liquid
d) compressibility of the liquid

92. If a body floating in a liquid returns back to its original position, when given a small angular displacement, the body is said to be in
a) neutral equilibrium b) stable equilibrium
c) unstange equilibrium d) none of the above

93. When a liquid is flowing through a pipe, the velocity of the liquid is
a) maximum at the centre and minimum near the walls
b) minimum at the centre and maximum near the walls
c) zero at the centre and maximum near the walls
d) maximum at the centre and zero near the walls

94. A flow through a long pipe at constant rate is called
a) Steady uniform flow b) steady non-uniform flow
c) Unsteady uniform flow d) unsteady non-uniform flow

95. A flow whose stream line is represented by a curve, is called
a) One-dimensional flow b) two-dimensional flow
c) Three-dimensional flow d) four-dimensional flow

96. The length of the divergent cone in a Venturimeter is_____that of the convergent Cone
a) equal to b) double c)three to four times d)five to six times

97. A Pitot tube is used to measure the
a) velocity of flow at the required point in a pipe
b) pressure difference between two points in a pipe
c) total pressure of liquid flowing in a pipe
d) discharge through a pipe

98. GUI means
a) Graphical United interface b) Geographical United Interface
c) Graphical User Interface d) Geological User Interface

99. In database primary key is called

a) multiple type key
b) Two different types of key
c) Unique type of key
d) first key

100. Geological formation which contains water is called
a) soil profile b) geo stratum c) Aquifer d) well

Mechanical (Section Code – 2)

1. If $3x + 2y + z = 0,\ x + 4y + z = 0,\ 2x + y + 4z = 0$ be a system of equations, then
   a) It is incomsistent
   b) It has only trivial solution $x = 0, y = 0, z = 0$
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   a) -9 b) 14 c) $\frac{1}{2}$ d) 2

3. The solution of $y'' = x + e^x,\ x \in R,\ y(0) = 1,\ y'(0) = 4\ is$
   a) $y = \frac{1}{2}x^2 + x + e^x$ b) $y = \frac{x^3}{3} + \frac{x^2}{2} + e^x$
   c) $y = \frac{1}{6}x^3 + 3x + e^x$ d) $y = x^3 + x^2 + x + e^x$

4. The area of the region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is
   a) 3π b) 4π c) 6π d) 36π

5. In an experiment the success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is
   a) $\frac{64}{729}$ b) $\frac{192}{729}$ c) $\frac{496}{729}$ d) $\frac{240}{729}$

6. Directional derivative of $f = xyz$ at the point (1,-1,-2) in the direction of the vector $2\bar{\imath} - 2\bar{\jmath} + \bar{k}$ is
   a) $\frac{7}{6}$ b) $\frac{7}{3}$ c) 1 d) $\frac{11}{6}$

7. If $u = x^2 + y^2 + z^2$ and $\bar{v} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ then div $(u\bar{v})$ is equal to
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8. The particular Integral of the differential equation $(D^3 - D)y = e^x + e^{-x}, D = \frac{d}{dx}$ is
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9. If $2x - x^2 + ay^2$ is to be harmonic, then *a* should be
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10. Which of the following equation is parabolic
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    c) $fxx + 2fxy + 4fyy = 0$ d) none

11. D' Alembert's principle is used for
    a) reducing the problem of kinetics to equivalent static's problem
    b) determining stresses in the truss

c) designing safe structures
d) solving kinematic problems

12. The Moment of Inertia of a thin ring external diameter D, internal diameter'd' about an axis perpendicular to the plane of the ring is
a) $\frac{\pi}{64}[(D)^4 + d^4)$ b) $\frac{\pi}{4}[(D)^4 - d^4)$ c) $\frac{\pi}{32}[(D)^4 + d^4)$ d) $\frac{\pi}{32}[(D)^4 - d^4)$

13. The ratio of limiting friction and normal reaction is known as
a) co-efficient of friction b) angle of friction
c) angle of repose d) sliding friction.

14. A Jet engine works on the principle of conservation of
a) energy b) mass
c) angular momentum d) linear momentum

15. The Maximum efficiency of a screw jack with square threads and friction angle of 30^o can be
a) 100% b) less than 50% c) more than 50% d) 50%

16. The deflection of a cantilever beam under load 'W' is 'S'. If its width is halved then the deflection under load 'W' will be
a) 2δ b) $\delta/2$ (c) 4δ d) $\delta/4$

17. Allen bolts are
a) provided with hexagonal depression in head.
b) self-locking bolts
c) used in aircraft application
d) uniform strength bolts.

18. Shape of woodruff key is
a) cylinder b) semicircle c) sphere d) trapezoid

19. Railroad car bearing is a
a) partial journal bearing b) ball bearing
c) roller bearing d) full journal bearing

20. Music wire is concerned with
a) musical instruments b) tuning forks
c) springs d) shafts

21. Anti – Friction bearing are
a) sleeve bearings b) gas lubricated bearings
c) ball and roller bearings d) special bearing requiring no lubricant

22. Miter gears are
a) right angled bevel gears having same number of teeth
b) spur gears of equal diameter and pitch.

c) helical gears of same module.
d) a kind of worm wheel and gear.

23. Lewis equation in gears is used to find the
a) tensile stress b) compressive stress in bending
c) fatigue stress d) endurance stress

24. If a spring is cut down into two springs the stiffness of the cut springs will be
a) half b) same c) double d) unpredictable

25. The edges of the boiler plate are beveled to an angle of
a) 45^o b) 60^o c) 72^o d) 80^o

26. A material capable of absorbing large amount of energy before fracture is known as
a) ductility b) toughness c) resilience d) shock proof

27. Hoop stress in a thin cylinder of diameter d and thickness't' subjected to pressure 'P' will be
a) $\frac{Pd}{4t}$ b) $\frac{Pd}{t}$ c) $\frac{Pd}{2t}$ d) $\frac{2Pd}{t}$

28. According to Lame's equation hoop stress for a thick cylinder at any point at a radius 'r' from centre is equal to
a) $\frac{b}{r^2}$ + a b) $\frac{b}{r^2}$ – a c) $\frac{b}{r} + a$ d) $\frac{b}{r} - a$

29. Maximum shear stress in a Mohr's circle is
a) equal to radius of Mohr's circle
b) greater than radius of Mohr's circle
c) less than the radius of Mohr's circle
d) unpredictable

30. The deformation of any structure takes place in such a manner that the work of deformation is a minimum. This is according to
a) castigliano's theorem b) theory of flexure
c) principle of least work d) maxwell's theorem

31. A hollow shaft of some cross-section area as solid shaft transmits
a) same torque b) less torque
c) more torque d) more or less depending on external diameter

32. The ratio of maximum shear stress and average stress in a circular section is
a) 1 b) 1.25 c) 1.5 d) 4/3

33. The point of contra-flexure is a point where
a) shear force is zero b) shear forces changes sign
c) bending moment changes sign d) bending moment is maximum

34. Auto frettage is the method of
a) calculating stresses in thick cylinders b) relieving thick cylinders
c) increasing life of thick cylinders d) joining thick cylinders

35. For a beam of uniform strength its depth being kept constant then its width will vary in proportion to
a) bending moment (M) b) $\sqrt{M}$ c) M^2 d) $\frac{I}{M}$

36. Distance of ram movement from its up position or its down position is called
a) Shut height b) Stroke c) Adjustments d) Die space.

37. When holes are required to be machined in several faces in small work piece the jig used is
a) Box jig b) Latch jig c) Pot jig d) Post jig.

38. Depending on the size and purpose of the press, stroke per minute may vary from
a) 1 to 100 b) 2 to 500 c) 5 to 500 d) 10 to 1000

39. Drill Jigs are useful for
a) small production b) mass production
c) both small and mass production d) not suitable for any production.

40. Angular post Jig is made
a) from a block of steel b) of welded construction
c) from the channel section d) from the square section

41. Slow plastic deformation of metals under a constant stress is known as
a) creep b) fatigue
c) endurance d) plastic deformation

42. An important property of malleable CI in comparison to grey CI is the high
a) compressive strength b) ductility
c) carbon content d) hardness

43. Railway rails are normally made of
a) mild steel b) alloy steel
c) cast iron steel d) high carbon steel

44. Which is the false statement about case hardening? Case hardening is done by
a) cyaniding b) electroplating
c) nitriding d) flame hardening

45. Cold rolled steel sheets contain carbon of the following
a) 0.1% b) 0.2%
c) 0.4% d) 0.6%

46. Preheating is essential in welding
a) HSS b) cast iron
c) all non ferrous metals d) none of the above

47. Lime stone is added in blast furnace to flux
a) MnO_2 b) SiO_2
c) NH_3 d) $KMnO_2$

48. Charpy test is conducted to measure
a) hardness b) fatigue resistance
c) brittleness d) malleability

49. The material used for coating the electrode called
a) binder b) slag c) deoxidizer d) flux

50. Which of the following materials has more shrinkage allowance
a) cast iron b) brass
c) lead d) aluminium alloy

51. In blanking operation, the angle of shear is provided on
a) die b) punch
c) both punch and die d) not provided at all

52. The spring back in steel of the order of
a) 0 to 0.5° b) 0.5° to 5°
c) 5° to 10° d) 10° to 13.5°

53. No lubricant is required when cutting threads in
a) tungsten carbide b) mild steel
c) titanium d) brass or CI

54. In automatic machine where large number of components are machined from a bar, it is held in
a) collet chuck b) magnetic chuck
c) three jaw chuck d) four jaw chuck

55. The taper on lathe spindle is
a) 1: 10 b) 1: 12 c) 1: 15 d) 1: 20

56. In electro chemical milling operation, the gap between tool and work is kept of the order of
a) no gap b) 0.25 mm c) 0.75 mm d) 1.25 mm

57. For mild steel work piece and carbide tool, maximum material is removed at temperature of
a) 100˚C b) 280˚C c) 400˚C d) 500˚C

58. Tungsten content in the H.S.S. cutting tool is
a) 18% b) 4% c)1% d) 16%

59. The recommended value of rake angle for machining brittle materials like brass is
a) -15^0 b) -5^0 c) 0^0 d) 10^0

60. It is required to divide a surface into six equal parts using, brown and sharp dividing head, index handle should be rotated by
a) 6 turns b) $6\frac{2}{3}$ turns c) $\frac{1}{6}$ turns d) $6\frac{1}{3}$ turns

61. Buffing process is used
a) To achieve flatness b) to achieve roundness
c) to improve surface finish d) to obtain very smooth reflective surfaces

62. What does symbol 'D' imply in work study
a) inspection b) transport
c) delay / temporary storage d) permanent storage

63. Gantt charts provide information about
a) break even point analysis b) production schedule
c) material handling layout d) determining selling price

64. PERT has following time estimate
a) one time estimate b) two time estimate
c) three time estimate d) four time estimate

65. Pickup the correct statement about relationship between various floats
a) free float = total float b) independent float = total float
c) free float > total float d) independent float < free float

66. Depreciation of machine is categorized under the head
a) direct expenses b) indirect expenses
c) receipts d) administrative expenses

67. The combination set can be used to
a) check angular surfaces b) draw circles and arcs
c) scribe lines d) none of the above

68. The term traceability in engineering metrology is concerned with
a) measuring machines b) optical instruments
c) limits and fits d) standards

69. Clinometer is related with
a) angle gauge b) spirit level
c) bevel protractor d) tolerance measurement

70. Tomlinson recorder is associated with measurement of
a) surface flaws b) surface perpendicularity
c) surface finish d) surface curvature

71. An ideal gas as compared to a real gas at very high pressure occupies
a)More volume b)Less volume
c) same volume d)unpredictable

72. Absolute zero pressure will occur
a) At sea level
b) At the centre of the earth
c) When the molecular momentum of the system becomes zero
d) Under vacuum conditions

73. Properties of substances like pressure, temperature and density, in thermodynamic coordinates are
a) Path functions b) Point functions
c) cyclic functions d) Real functions

74. Work done in an adiabatic process between a given pair of end states depends on
a) the end states only b) The value of index n
c) The value of heat transferred d) Mass of the system

75. If the value of n is infinitely large in a polytropic process $PV^n = C$, then the process is known as
a) Constant volume b) Constant pressure
c) Constant temperature d) Enthalpy

76. If a fluid expands suddenly into vacuum through an orifice of large dimension, then such a process is called
a) free expansion b) Hyperbolic expansion
c) adiabatic expansion d) Parabolic expansion

77. The more effective way of increasing efficiency of Carnot engine is to
a) Increase higher temperature b) decrease higher temperature
c) Increase lower temperature d) Decrease lower temperature

78. When a gas flows through a very long pipe of uniform cross section, the flow is approximately
a) isentropic b) isobaric c) isothermal d) adiabatic

79. A gas is compressed in a cylinder by a movable piston to a volume one-half its original volume. During the process 300 kJ heat left the gas and the internal energy remained the same. The work done on gas in Nm will be

a) 300 b) 300000 c) 30 d) 30,000

80. If 'H' be the heat supplied to a system to do work 'W' with change in internal energy of ΔU, then

a) $H = \Delta U + W$ b) $\Delta U = H + W$ c) $W = H + \Delta U$ d) $H = W / \Delta U$

81. Change of enthalpy in a closed system is equal to heat transferred if the reversible process takes place at constant
a) Pressure b) Temperature c) Volume d) Internal energy

82. An important characteristic of absorption system of refrigeration is
a) Noisy operation b) Quiet operation
c) Cooling below 0^oC d) Very little power consumption

83. One ton of refrigeration is equal to the refrigeration effect corresponding to melting of 1000 kg of ice
a) in 1 hour b) in 1 minute c) in 24 hours d) in 12 hours

84. If $T_1$and T_2 be the highest and lowest absolute temperatures encountered in a refrigeration cycle working on reversed Carnot cycle, then COP is equal to

a) $T_1 / (T_1 - T_2)$ b) $T_2 / (T_1 - T_2)$ c) $T_1 - T_2) / T_1$ d) $T_1 - T_2) / T_2$

85. Domestic refrigerator working on vapour compression cycle uses the following type
of expansion device.
a) electrically operated throttling valve b)manually operated valve
c) thermostatic valve d) capillary tube

86. Condensing temperature in a refrigerator is the temperature
a) of cooling medium b) of freezing zone
c) of evaporator d) at which refrigerant gas becomes liquid

87. Super heating in a refrigeration cycle
a) increases COP b) decreases COP
c) COP remains unaltered d) other factors decide COP

88. Which of the following is not a desirable property of a refrigerant?
a) high miscibility with oil b) low boiling point
c) good electrical conductor d) large latent heat

89. The COP of a refrigeration cycle with lowering of condenser temperature, keeping the evaporator temperature constant, will
a) increase b) decrease
c) may increase or decrease depending on the type of refrigerant used
d) remain unaffected

90. Vertical lines on pressure-enthalpy chart show constant
a) pressure lines b) temperature lines
c) total heat lines d) entropy lines

91. Usually central air conditioning system as compared to individual system has
a) higher overall efficiency b) lower overall efficiency
c) same overall efficiency d) depends on other factors

92. The part of the vehicle which holds the passengers and the cargo to be transported is known as
a) chassis b) hull c) aft d) sedan

93. As the number of cylinders on multi cylinder engines increases the power to weight ratio
a) remains the same b) decreases c) increases d) becomes zero

94. Which one of the following is mounted between the engine and gear box?
a) propeller shaft b) differential gear
c) reductor fan d) clutch

95. In case of four cylinder opposed cylinder engines, the firing order is
a) 1-4-3-2 b) 1-3-4-2 c) 1-2-3-4 d) 1-2-4-3

96. In a scooter engine the cylinder is lubricated by
a) pressure lubrication b) splash lubrication
c) lubrication plug d) mixing lubricating oil in the fuel

97. Ignition coil is used to
a) Step up current b) Step down current c) Step up voltage d) Step up power

98. In the fuel injection pump of a diesel engine, the fuel injection timing is adjusted by the
a) Delivery valve b) Rotation of plunger c) List of plunger d) Pump camshaft

99. The escape of burned gases from the combustion chamber past the pistons and into the crank case is called
a) gas loss b) blow-by c) by-pass d) passed gas

100. Which of the following is not a part of the hydraulic braking system?
a) brake shoe b) wheel cylinder c) brake pedal d)steering mechanism

Electrical (Section Code-03)

1. If $3x + 2y + z = 0,\ x + 4y + z = 0,\ 2x + y + 4z = 0$ be a system of equations, then
   a) It is incomsistent
   b) It has only trivial solution $x = 0, y = 0, z = 0$
   c) It can be reduced to a single equation and so a solution does not exist
   d) determinant of the matrix of coefficients is Zero

2. If 7 and 2 are two roots of the follwing equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then its third root is
   a) -9 b) 14 c) $\frac{1}{2}$ d) 2

3. The solution of $y'' = x + e^x,\ x \in R,\ y(0) = 1,\ y'(0) = 4\ is$
   a) $y = \frac{1}{2}x^2 + x + e^x$ b) $y = \frac{x^3}{3} + \frac{x^2}{2} + e^x$
   c) $y = \frac{1}{6}x^3 + 3x + e^x$ d) $y = x^3 + x^2 + x + e^x$

4. The area of the region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is
   a) 3π b) 4π c) 6π d) 36π

5. In an experiment the success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is
   a) $\frac{64}{729}$ c) $\frac{192}{729}$ c) $\frac{496}{729}$ d) $\frac{240}{729}$

6. Directional derivative of $f = xyz$ at the point (1,-1,-2) in the direction of the vector $2\bar{\imath} - 2\bar{\jmath} + \bar{k}$ is
   a) $\frac{7}{6}$ b) $\frac{7}{3}$ c) 1 d) $\frac{11}{6}$

7. If $u = x^2 + y^2 + z^2$ and $\bar{v} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ then div $(u\bar{v})$ is equal to
   a) 5*u* b) 6*u* c) 0 d) -*u*

8. The particular Integral of the differential equation $(D^3 - D)y = e^x + e^{-x}, D = \frac{d}{dx}$ is
   a) $\frac{1}{2}(e^x + e^{-x})$ b) $\frac{1}{2}x(e^x + e^{-x})$ c) $\frac{1}{2}x^2(e^x + e^{-x})$ d) $\frac{1}{2}x^2(e^x - e^{-x})$

9. If $2x - x^2 + ay^2$ is to be harmonic, then *a* should be
   a) 1 b) 2 c) 3 d) 0

10. Which of the following equation is parabolic?
    a) $fxy - fx = 0$ b) $fxx + 2fxy + fyy = 0$ c) $fxx + 2fxy + 4fyy = 0$
    d) none

11. RST n' refers to
    a) Reset operations b) restart operations
    c) Software interrupts d) hardware interrupts

12. Programming model of microprocessor refers to
    a) signal processing diagram b) timing diagram
    c) temporary registers d) instruction set of the processor

13. In 8255, the handshaking signals are in port----------
    a) A b) B c) C d) all of the above

14. The difference between 8253 and 8254 is
    a) power supply b) status word
    c) Read back command d) no. of timer / counter sections

15. In 8096, HSO is a
    a) FIFO b) LIFO c) BAM d) CAM

16. In 8085, SPHL is to
    a) copy SP to HL b) copy HL to SP
    c) exchange HL with SP d) None of the above

17. High impedance state of a Bus is
    a) a logic zero b) Full coupled state
    c) an isolation state d) a logic '1'

18. The fast acting memory between processor and RAM is
    a) Virtual memory b) Cache memory
    c) Dynamic memory d) Extended memory

19. Which of the following is the internal memory of the computer?
    a) CPU Register b)Cache
    c) Main Memory d) All of these.

20. A software program stored in a ROM that cannot be changed easily is called
    a) Hardware b) Application software
    c) Linker d) Firmware

21. The operating system manages
    a) Memory b) Processor
    c) Disk and I/O devices d) All of the above.

22. Part of a program where the shared memory is accessed and which should be executed indivisibly is called
    a) Critical section b) Directory
    c) Semaphores d) Mutual exclusion

23. A Complier for a high level language that runs on one machine and produces code for a different machine is called
a) Optimizing compiler
b) One pass compiler
c) Cross compiler
d) Multi-pass compiler

24. The system which permits a large number of users at various remote terminals to simultaneously use a centrally located computer is called
a) Servomechanism system
b) Time sharing system
c) Mainframe system
d) Load sharing system

25. Which of the following is the analogous pair under force current analogy?
a) Moment-voltage
b) Inertia-voltage
c) Viscous friction coefficient-reciprocal of resistance
d) Spring stiffness –capacitance

26. Under force-voltage analogy ,viscous friction coefficient is analogous to
a) Reciprocal of capacitance
b) Reciprocal of inductance
c) Charge
d) Resistance

27. A system with characteristic equation $s^3 + 14\,s2 + 56s + k = 0$ will be stable if
a) $0<k< 784$
b) $1<k<64$
c) $10>k>660$
d) $1<k<487$

28. The roots of the characteristic equations of several systems are given below. Which set of roots represents unstable system?
a) -1,-2
b) (-1+j),(-1-j)
c) 2,-1,-3
d) (-2+3j),(-2-3j),-2

29. Frequency domain analysis is preferred when dealing with systems having input as
a) Sinusoidal with variable frequency and amplitude
b) Sinusoidal with fixed frequency
c) Non sinusoidal with lagging power factor.
d) Ramp and parabolic

30. The response of a control system having damping factor as unity will be
a) Oscillatory
b) Undamped
c) Overdamped
d) Critically damped

31. Damping is proportional to
a) Inverse of the square root of gain
b) Square root of gain
c) Inverse of gain
d) Gain

32. Integral error compensation in a control system
a) Minimizes steady state error b) Increases steady state error
c) No effect on steady state error d) Makes the steady state error as zero.

33. Which of the following is not in frequency domain?
a) Nyquist criterion b) Bode plot
c) Root locus plot d) All of the above.

34. A shunt generator running at 600 rpm has an induced EMF of 200 volts.If the speed increases to 750 rpm, the induced EMF will be
a) 150V b) 205V
c) 225V d) 250V

35. The armature reaction of an unsaturated DC machine is
a) Non-magnetising b) Magnetising
c) Demagnetising d) Cross-magnetising

36. The type of DC motor control preferred for the applications where unusually wide and very sensitive speed control is required, will be
a) Armature control b) Ward –leonard control
c) Voltage control d) Flux control

37. The retardation test in case of shunt motors and generator is used to determine
a) Friction losses b) Eddy current losses
c) Copper losses d) Stray losses.

38. Hopkinson's test is conducted at
a) Full load b) Part load
c) Low load d) No load

39. In case of a shunt motor if the supply voltage is increased by 20%,which of the following will decrease?
a) Starting torque b) Full load speed
c) Full load current d) None of the above.

40. Frog –leg winding is
a) Same as simplex winding
b) Same as duplex winding
c) Combined lap and wave winding on a single rotor
d) Duplex wave winding on a single rotor.

41. Compensator winding is provided in a DC motor
a) To increase main field AT
b) To prevent large speed drop
c) To prevent commutator flash over upon sudden change in load
d) To achieve good commutations

42. If two transformers not having the same percentage impedances are connected in parallel for sharing a load, then
    a) One of the transformers will be always fully loaded.
    b) One of the transformer is likely to get burnt
    c) Power factor of both the transformers will be lagging
    d) Load sharing of the transformers will not be proportional to KVA ratings

43. The percentage regulation of a good transformer should be near
    a) 100 b) 50
    c) 10 d) 1

44. For the same power rating, a lower voltage alternators will be
    a) More efficient b) Larger in size
    c) Operating at high RPM d) More costly

45. An alternator is said to be over excited when it is operating at
    a) Unity power factor b) Leading power factor
    c) Lagging power factor d) Lagging to leading power factor

46. Pitch factor is the ratio of the EMFs of
    a) Short pitch coil to full pitch coil
    b) Full pitch winding to concentrated winding
    c) Full pitch winding to short pitch winding
    d) Distributed winding to full pitch winding.

47. The armature current of a synchronous motor has large values for
    a) Low excitation only
    b) High excitation only
    c) Both low and high excitation only
    d) Depends on other factors

48. The maximum torque that a synchronous motor can develop without losing its synchronization, is known as
    a) Breaking torque b) Synchronizing torque
    c) Pullout torque d) Slip torque

49. Synchronous motors are generally of
    a) Induction type machines b) Cylindrical pole type machine
    c) Salient type machines d) Hysteresis type machines

50. The injected EMF in the rotor of induction motor must have
    a) Low frequency
    b) Same frequency as the slip frequency
    c) Same phase as the rotor phase
    d) None of the above

51. The starting torque of a three phase induction motor can be increased by
a) Increasing the rotor resistance b) Decreasing the rotor resistance
c) Increasing the rotor reactance d) Decreasing the rotor reactance

52. Synchronous wattage of induction motor means
a) Rotor input in watts
b) Stator input in watts
c) Combined stator and rotor input in watts
d) Shaft output in watts

53. In a photo conductive cell, the resistance of the semiconductor material varies ____ with the intensity of incident light
a) Directly b) Inversely
c) Exponentially d) Logarithmically

54. The main purpose of using optical isolators is to provide protection to devices from
a) high voltage transients b) surge voltages
c) low-level noise d) all of the above

55. Current flow in a semiconductor depends on the phenomenon of
a) Drift b) Diffusion
c) Recombination d) all the above

56. When a BJT is in saturation
a) $I_1 = 0$ b) $V_{CE} = 0$
c) I_B controls I_C d) V_{CE} has positive value

57. If is a BJT, $I_B = 100\mu A$ & $I_C = 10\mu A$, in what range does the value of its β lie?
a) 0.1 to 1.0 b) 1.01 to 10
c) 10.1 to 100 d) 100.1 to 1000

58. When an NPN transistor is cut off, its V_{CE}
a) equals Vcc & Ic is high b) equals Vcc & Ic is zero
c) is low & Ic is high d) is high & Ic is low

59. The basic reason why a FWR has twice the efficiency as that of half wave rectifier is that
a) it makes use of a transformer
b) its ripple factor is much less
c) it utilizes both half-cycle of the input
d) it output frequency is double the line frequency

60. The output of a half wave rectifier is suitable only for
a) running an radios b) running an motor
c) running in tape recorder d) charging batteries

61. The MOSFET switch in its on-state may be considered equivalent to
a) R b) L
c) C d) Battery

62. The uncontrolled electronic switch employed in power electronic converters is
a) Thyristor b) BJT
c) Diode d) MOSFET

63. The RMS value of a HWR symmetrical square wave current is
a) $\sqrt{2}A$ b) $\frac{1}{\sqrt{2}}A$
c) 1A d) $\sqrt{3}A$

64. A power MOSFET is a
a) voltage controlled device b) current controlled device
c) frequency controlled device d) Time controlled device

65. For good stability, the tuned circuit should have
a) High Q b) Low R
c) Low L d) Low C

66. A network is said to be nonlinear if it does not satisfy
a) Superposition condition
b) Homogeneity condition
c) Both superposition and homogeneity conditions
d) Associative condition

67. Tellegens theorem is applicable to
a) linear networks only b) nonlinear networks only
c) linear and nonlinear networks d) none of these

68. In LCR circuit, at resonance
a) current is maximum, power factor is zero
b) current is maximum, power factor is unity
c) current is minimum, power factor is unity
d) current is minimum, power factor is zero

69. If there are b- branches and n- nodes, the number of equation is given by
a) B b) b-n
c) n-1 d) b-n+1

70. Attenuation in nepers in a network with input and output currents Ii and Io is
a) 10 log (Ii / Io) b) 20 log (Ii / Io)
c) ln (Ii / Io) d) 20 ln (Ii / Io)

71. The shunt element of prototype high pass filter is
    a) resistive
    b) inductive
    c) capacitive
    d) combination of inductive and capacitive

72. The dual of a link is
    a) node b) loop
    c) tree branch d) twig

73. Three equal resistances are connected in delta. If this delta is converted into star
    a) the resistances of the star network will be lower than the resistances of delta network
    b) the resistances of both the networks will be equal
    c) the resistances of the star network will be larger than the resistances of delta network
    d) the resistance will become zero

74. A 3 phase 4 wire system supplies a balanced star load. The current in each phase is 5A. The current in the neutral will be
    a) 5A b) $5\sqrt{3}$A
    c) 0 d) 15A

75. Which power is measured with the help of an induction wattmeter?
    a) Reactive power b) Real and reactive power
    c) Apparent power d) Only true power

76. A 45V source with an internal resistance of 2 Ohm is connected across a wire wound resistor maximum power will be dissipated in the resistor when its R is
    a) 0 b) 2 Ohms c) 45 Ohms d) Infinity

77. Watt hour efficiency is always
    a) More than Ampere hour efficiency
    b) Equal to ampere hour efficiency
    c) Less than ampere hour efficiency
    d) None of the above

78. Siemens is the unit for measuring
    a) Conductance b) Resistance
    c) Flux density d) Electric density

79. An ideal voltage source should have
    a) Zero source resistance
    b) Infinite source resistance
    c) Large value of EMF
    d) Small value of EMF

80. SCR can be brought to forward conducting state with gate circuit open when the applied voltage exceeds
    a) Forward break over voltage
    b) reverse breakdown voltage
    c) 1.5V
    d) 0.7V

81. In a thyrister anode current is made up of
    a) Electrons only b) holes only
    c) Electrons and holes d) Electrons or holes

82. For an SCR, di / dt protection is achieved through the use of
    a) R in series with SCR b) RL in series with SCR
    c) L in series with SCR d) L in parallel with SCR

83. If the gate current of SCR is increased, the forward breakdown voltage will
    a) Increase b) Decrease
    c) Not change d) Be Infinite

84. Which of the following PN-PN devices does not have the gate terminal?
    a) Triac b) SCS
    c) SUS d) Complementary SCR

85. In a normal three phase rectifier SCR cannot be fired during
    a) first 10^o of its anode voltage b) first 30^o of its anode voltage
    c) first 45^o of its anode voltage d) first 90^o of its anode voltage

86. A thyrite resistor is used
    a) to provide temperature compensation
    b) to generate phase shift
    c) to rectify very high voltages
    d) by pass voltage surges in equipments.

87. For continuous conduction in a single phase semi converter each SCR conducts for
    a) α b) $\Pi - \alpha$ c) Π d) $\Pi + \alpha$

88. Each diode of a 3 phase 6 pulse bridge diode rectifier conducts for
    a) 60^o b) 120^o c) 180^o d) 90^o

89. In a single phase full converter the number of SCRs conducting during overlap is
    a) 2 b) 1 c) 3 d) 4

90. A 3- phase full converter has an average output voltage of 200V for 0 degree firing angle and for resistive load. For a firing angle of 90 degree the ouptput voltage would be
    a) Zero b) 50 V c) 100 V d) 26.8V

91. A four quadrant operation requires
    a) two full converters in series
    b) two full converters connected back to back
    c) two full converters in parallel
    d) two semi converters back to back

92. In dc choppers the waveforms for input and output voltages are respectively
    a) discontinuous , continuous b) both continuous
    c) both discontinuous d) continuous, discontinuous

93. The minimum clearance above the ground of the lowest conductor for low and medium voltage lines across the street must be
    a) 4 m b) 5.791 m c) 6.791 m d) 7.591 m

94. The disruptive critical voltage will
    a) decrease with the increase of the moisture content in air
    b) increase with the increase of the moisture content in air
    c) increase with the decrease of the moisture content in air
    d) decrease with the decrease of the moisture content in air

95. Series capacitors are used for improving the line
    a) capacitive reactance b) inductive reactance
    c) voltage d) regulation

96. For which shape of conductor the corona loss will be least?
    a) circular b) oval
    c) flat d) independent of shape

97. Guarding transmission line
    a) improves power factor b) reduces earth capacitances of lowest unit
    c) reduces transmission losses d) improves regulation

98. Ferranti effect on long overhead lines is experienced when
    a) the line is lightly loaded b) power factor is unity
    c) power factor is leading d) corona effect is dominant

99. Phase modifiers in AC transmission lines are
    a) Synchronous machines b) induction machines
    c) DC machines d) transformers

100. Stringing chart represents a graph of
    a) tension – temperature b) sag- temperature
    c) load- temperature d) resistance- temperature

Electronics (Section code 04)

1. If $3x + 2y + z = 0,\ x + 4y + z = 0,\ 2x + y + 4z = 0$ be a system of equations, then
   a) It is incomsistent
   b) It has only trivial solution $x = 0, y = 0, z = 0$
   c) It can be reduced to a single equation and so a solution does not exist
   d) determinant of the matrix of coefficients is Zero

2. If 7 and 2 are two roots of the follwing equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then its third root is
   a) -9 b) 14 c) $\frac{1}{2}$ d) 2

3. The solution of $y'' = x + e^x,\ x \in R,\ y(0) = 1,\ y'(0) = 4\ is$
   a) $y = \frac{1}{2}x^2 + x + e^x$ b) $y = \frac{x^3}{3} + \frac{x^2}{2} + e^x$
   c) $y = \frac{1}{6}x^3 + 3x + e^x$ d) $y = x^3 + x^2 + x + e^x$

4. The area of the region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is
   a) 3π b) 4π c) 6π d) 36π

5. In an experiment the success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is
   a) $\frac{64}{729}$ c) $\frac{192}{729}$ c) $\frac{496}{729}$ d) $\frac{240}{729}$

6. Directional derivative of $f = xyz$ at the point (1,-1,-2) in the direction of the vector $2\bar{\imath} - 2\bar{\jmath} + \bar{k}$ is
   a) $\frac{7}{6}$ b) $\frac{7}{3}$ c) 1 d) $\frac{11}{6}$

7. If $u = x^2 + y^2 + z^2$ and $\bar{v} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ then div $(u\bar{v})$ is equal to
   a) 5*u* b) 6*u* c) 0 d) -*u*

8. The particular Integral of the differential equation $(D^3 - D)y = e^x + e^{-x}, D = \frac{d}{dx}$ is
   a) $\frac{1}{2}(e^x + e^{-x})$ b) $\frac{1}{2}x(e^x + e^{-x})$ c) $\frac{1}{2}x^2(e^x + e^{-x})$ d) $\frac{1}{2}x^2(e^x - e^{-x})$

9. If $2x - x^2 + ay^2$ is to be harmonic, then *a* should be
   a) 1 b) 2 c) 3 d) 0

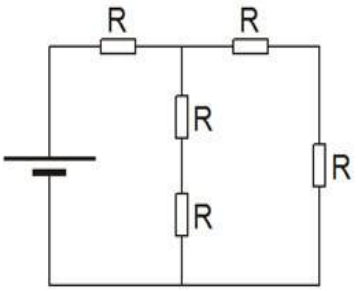
10. Which of the following equation is parabolic ?
    a) $fxy - fx = 0$ b) $fxx + 2fxy + fyy = 0$ c) $fxx + 2fxy + 4fyy = 0$
    d) none

11. When a fourth resistor is connected in parallel with three resistors connected in series, the total resistance
    a) increases by one-fourth b) increases
    c) decreases d) remains the same

12. A series circuit has a 24 V source and a total resistance of 120 Ω. The current through each resistor is

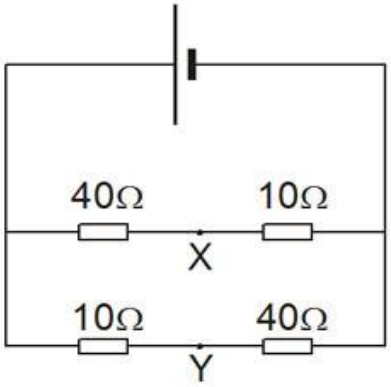
a) 24 mA b) 200 mA (c) 120 mA d) 20 mA

13. Each of the resistors in the circuit below has a resistance of R Ohms. What is their total resistance (in terms of R).



a) 3.67 R b) 4R c) 2R d) 5R

14. Calculate the equivalent resistance of the four resistors between X and Y in the circuit shown below.



a) 100 b) 50 c) 25 d) 40

15. An open coil has

a) Infinite resistance and zero inductance
b) Zero resistance and high inductance
c) Infinite resistance and normal inductance
d) Zero resistance and inductance

16. Two coils in series have an equivalent inductance of 3H when connected in aiding. If the self inductance of the first coil is 1H, what is the self inductance of the second coil (assume m = 0.5)

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

17. The maximum output voltage of a certain low-pass filter is 15 V. The output voltage at the critical frequency is

a) 0 V b) 15 V c) 10.60 V (d) 21.21 V

18. Dot convention in coupled circuits is used
    a) To measure the mutual inductance
    b) To determine the polarity of mutually induced voltage in coils
    c) To determine the polarity of self induced voltage in coils
    d) To measure the self inductance

19. A high-pass filter consists of a capacitor of 0.2 μF and an inductor of 1mH. The output is taken across the resistor. The circuit's critical frequency is
    a) 5623 Hz b) 562.3 Hz c) 22.5 KHz d) 2250 Hz

20. What is the total reactance of a series RLC series circuit at resonance
    a) Equal to Xc b) Equal to X_l
    c) R d) Zero

21. You have an unknown type of diode in a circuit. You measure the voltage across it and find it to be 0.3 V. The diode might be
    a) a silicon diode
    b) a germanium diode
    c) a forward-biased silicon diode
    d) a reverse-biased germanium diode

22. Single-element semiconductors are characterized by atoms with ____ valence electrons.
    a) 3 b) 4 c) 5 d) 2

23. The term bias in electronics usually means
    a) the value of ac voltage in the signal
    b) the condition of current through a pn junction
    c) the value of dc voltages for the device to operate properly
    d) the status of the diode

24. Which capacitance dominates in the forward-bias region?
    a) Diffusion b) Transition
    c) Depletion d) None of the above

25. The Schottky diode is used
    a) in high-power circuits
    b) in circuits requiring negative resistance
    c) in very fast-switching circuits
    d) in power supply rectifiers

26. You have an application for a diode to be used in a tuning circuit. A type of diode to use might be
    a) an LED b) a Schottky diode
    c) a Gunn diode d) a varactor

27. LEDs are made out of
a) silicon b) germanium
c) gallium arsenide d) silicon and germanium, but not gallium

28. The process of emitting photons from a semiconductive material is called
a) photoluminescence b) gallium arsenide
c) electroluminescence d) gallium phosphide

29. A laser diode normally emits
a) coherent light
b) monochromatic light
c) coherent and monochromatic light
d) neither coherent nor monochromatic light

30. You need to design a relaxation oscillator circuit. The most likely device to use might be
a) an SCR b) a UJT (c) a triac d) a 4-layer diode

31. Electric flux density and field are related by
a) D = E b) $D = E/\varepsilon$ c) $D = \mu E$ d) $D = \varepsilon E$

32. The S.I unit of magnetic flux is
a) Weber b) Coulomb c) Tesla d) Gauss

33. Ampere's law is applicable for
a) open path only b) closed path only
c) either open or closed path d) square path only

34. Magnetic susceptibility of free space is
a) zero b) 1 c) μ_r d) μ_0

35. Poynting vector is given by
a) $\mathbf{E} \times \mathbf{H}$ b) **E. H** **c)** $\mathbf{H} \times \mathbf{E}$ d) **H. E**

36. For a static magnetic field
a) $\nabla \times \mathbf{B} = \rho$ b) $\nabla \times \mathbf{B} = \mu \mathbf{J}$ c) $\nabla . \mathbf{B} = \mu_0 \mathbf{J}$ **d)** $\nabla \times \mathbf{B} = 0$

37. A 4:1 multiplexer requires…… data select line
a) 1 b) 2 c) 3 d) 4

38. A field can exist if it satisfies
a) Gauss's law b) Faraday's law
c) Coulomb's law d) all Maxwell's equations

39. Maxwell's equation, $\nabla \times \mathbf{B} = 0$ is due to

a) $\mathbf{B} = \mu\mathbf{H}$ **b) $\mathbf{B} = \mathbf{H}/\mu$**
c) non-existence of a monopole d) **$\mathbf{B} = \mathbf{H}$**

40. The direction of propagation of EM wave is given by
a) the direction of **E** b) the direction of **H**
c) the direction of **E** × **H** d) the direction of **E. H**

41. A parity bit is
a) used to indicate uppercase letters b) used to detect errors
c) is the first bit in a byte d) is the last bit in a byte

42. In CCD
a) small charge is deposited for logical 1
b) small charge is deposited for logical 0 or 1
c) small charge is deposited for logical 0 and large charge for logical 1
d) none of above

43. The internal structure of PLA is similar to
a) RAM b) ROM
c) both RAM or ROM d) neither RAM nor ROM

44. A buffer is
a) always non-inverting b) always inverting
c) inverting or non-inverting d) none of above

45. A+A.B= ?

a) B b) A.B c) A d) A or B

46. In a four variable Karnaugh map eight adjacent cells give a
a) Two variable term b) single variable term
c) Three variable term d) four variable term

47. As compared to TTL, CMOS logic has
a) higher speed of operation b) higher power dissipation
c) smaller physical size d) all of above

48. A 3 bit binary adder should be
a) 3 full adders b) 2 full adders and 1 half adder
c) 1 full adder and 2 half adder d) 3 half adders

49. Which device changes parallel data to serial data?
a) decoder b) multiplexer c) demultiplexer d) flip flop

50. Two 16:1 and one 2:1 multiplexers can be connected to form a
a) 16:1 multiplexer b) 32:1 multiplexer
c) 64:1 multiplexer d) 8:1 multiplexer

51. The Early effect in a bipolar junction transistor is caused by

a) fast turn-on
b) fast turn-off
c) large collector-base reverse bias
d) large emitter-base forward bias

52. Thermal runaway is not possible in FET because as the temperature of FET increases
a) the mobility decreases b) the transconductance increases
c) the drain current increases d) none of the above

53. The approximate input impedance of the OPAMP circuit which has R_i = 10K, R_f = 100K, R_L = 10K
a) ∞ b) 120K c) 110K d) 10K

54. The effective channel length of a MOSFET in saturation decreases with increase in
a) gate voltage b) drain voltage
c) source voltage d) body voltage

55. In a p-n junction diode under reverse bias , the magnitude of electric field is maximum at
a) the edge of the depletion region on the p-side
b) the edge of the depletion region on the n-side
c) the p-n junction
d) the center of the depletion region on the n-side

56. An n-channel JFET has I_{DSS}=2mA and V_p= -4V. Its trans-conductance g_m= ___ (in mA / V) for an applied gate to source voltage V_{GS}=-2V is
a)0.25 b) 0.5 c) 0.75 d) 1

57. Class AB operation is often used in power (large signal) amplifiers in order to
a) get maximum efficiency
b) remove even harmonics
c) overcome a crossover distortion
d) reducing collector dissipation

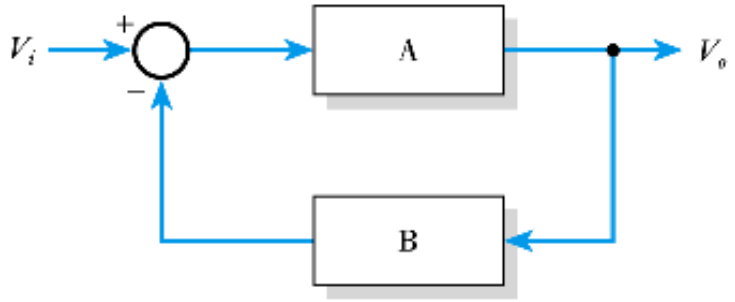
58. Most of the linear ICs are based on the two-transistor differential amplifier because of its
a) input voltage dependent linear transfer characteristic
b) high voltage gain
c) high input resistance
d) high CMRR

59. Negative feedback in an amplifier
a) Reduces gain b) Increase frequency &phase distortion
c) Reduces bandwidth d) Increases noise

60. The action of JFET in its equivalent circuit can best be represented as a

a) Current controlled Current source
b) Current controlled voltage source
c) Voltage controlled voltage source
d) voltage controlled current source

61. What is the voltage gain of the following arrangement?



a) $(1+AB)/A$ b) $B/(1+AB)$ c) $(1+AB)/B$ d) $A/(1+AB)$

62. Under what conditions does the gain of a feedback system approximate to $1/B$?
a) The loop gain $AB << 1$ b) The loop gain $AB >> 1$.
c) The feedback path gain $B >> 1$ d) The forward path gain $A >> 1$

63. Liquid crystal displays (LCDs) are widely used in a range of electronic systems. Which of the following describes the construction of such a display?

a) Two sheets of polarized glass with a thin layer of oily material sandwiched between them
b) Two sheets of conducting material separated by a layer of insulating dielectric
c) Two sheets of conducting material with a thin layer of oily material sandwiched between them
d) A pn junction formed using materials such as gallium arsenide or gallium phosphide

64. What is the effect of negative feedback on the bandwidth of an amplifier?
a) It increases the bandwidth, often by a factor of 1/B
b) It increases the bandwidth, often by a factor of (1 + AB).
c) It reduces the bandwidth, often by a factor of 1/B
d) It reduces the bandwidth, often by a factor of (1 + AB).

65. The most useful transducer for displacement sensing with excellent sensitivity, linearity and resolution is
a) an incremental encoder b) an absolute encoder
c) LVDT d) a strain gauge

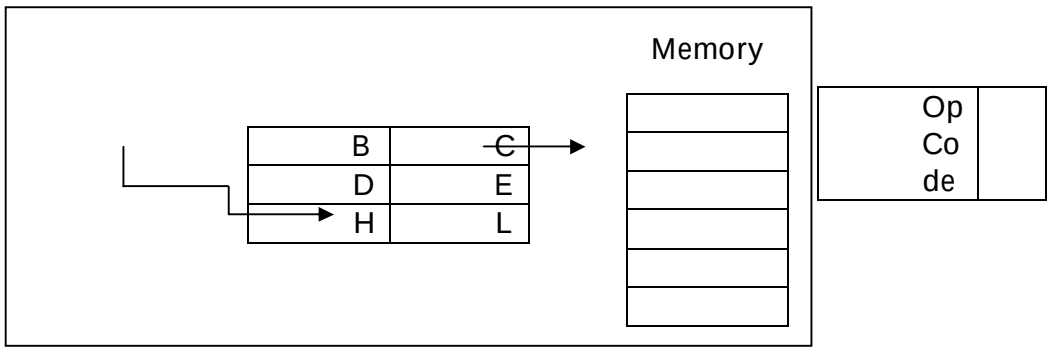
66. Consider the following program for 8085
MVIA, OOH,
MVIA, 53H,
CMA
The contents of accumulator at the end of this program will be

a) OACH b) 35H c) OADH d) 54H

67. Which of the following is a valid integer constant?
a) 17.0 b) -18.58 c) 10.114 d) -810

68. When we use RRC instruction once in 8085, the number is
a) multiplied by 2 b) divided by 2
c) multiplied by 4 d) divided by 4

69. The addressing mode depicted in figure is?



a) direct b) register c) register indirect d) immediate

70. Which of the following has unique representation of 0?
a) Sign magnitude b) 1's complement
c) 2's complement d) both (b) and (c)

71. In a RAM Chip with a total of 8096 words the word addresses range from
a) 1 to 8096 b) 0 to 8095
c) 1 to 8095 d) 0 to 8096

72. The chip 8259 is a
a) Programmable interrupt controller b)programmable peripheral interface
c) I/O device d) memory chip

73. IC (instruction cycle), FC (Fetch cycle) and EC (Execution cycle) are related as

a) IC=FC-EC b) IC=FC+EC c) IC=FC+2EC d) EC=IC+FC

74. The 8051 can handle _____ interrupt sources
a) 3 b) 4 c) 5 d) 6

75. The condition occurring when two or more devices try to write data to a bus simultaneously is called _____.
a) address decoding b) bus contention
c) bus collisions d) address multiplexing

76. Which of the following signal is the example for deterministic signal?
a) step b) ramp
c) exponential d) all of the above

77. ROC of x(n) contains
a) poles b) zeros c) no poles d) no zeros

78. The z transform of $a^n u(n)$
a) $\frac{-z}{(z-a)}$ b) $\frac{1}{\left(1-\frac{a}{z}\right)}$ c) $\frac{z}{\left(z-\frac{1}{a}\right)}$ d) $\frac{z}{\left(z-\frac{a}{z}\right)}$

79. The convolution of u(t) with u(t) will be equal to
a) $\delta(t)$ b) u(t) c) tu(t) d) $t^2u(t)$

80. In an N-point sequence, if N=16 the total number of complex additions and multiplications using Radix-2 FFT are
a) 64 and 80 b) 80 and 64 c) 64 and 32 d) 24 and 12

81. _____ is the optimal technique for detecting a known waveform in random noise.
a) correlation b)impulse c) convolution d)none of these

82. The addressing mode that is convenient for FFT computation is
a) Indirect addressing b) Circular mode
c) Bit reversed addressing d) Memory mapped

83. Which of the following systems are causal?
i. y(n)=x(n)+0.25x(n-1)+0.5x(n-2)
ii. y(n)=x(n)+0.25x(n-3)+0.75y(n-1)
iii. y(n)=x(n+1)-0.5x(n-1)+0.8x(n-1)
iv. y(n)=x(n)+0.5x(n-1)+0.5y(n-1)+0.8y(n-2)

a) i,ii,,iv b) i,iii,iv c) ii,iii,iv d) i,ii,iii

84. The number of stages of FFT computations required for the computation of the DFT of a 512 point sequence is
a) 9 b) 8 c) 7 d) 6

85. FIR filter always gives

a) Non-linear phase response b) Linear Phase response
c) Unstable response d) Unit magnitude response

86. A 4 GHz carrier in DSB/SC modulated by a low-pass message signal with maximum frequency of 2 MHz. The resultant signal is to be ideally sampled. The minimum, frequency of the sampling in train should be
a) 4 MHz b) 8 MHz c) 8 GHz d) 8.004 GHz

87. An FM signal with a modulation index 9 is applied to a frequency Tripler. The modulation index in the output signal will be
a) 0 b) 3 c) 9 d) 27

88. In spread spectrum technique
a) a modulated signal is modulated again
b) a modulated signal is modulated twice again
c) the power of a modulated signal is increased
d) the noise component of a modulated signal is decreased

89. The different channels in a TDM receiver are separated by
a) Integration b) differentiation
c) use of AND gate d) use of OR gate

90. In which error check technique of data communication 2's complement of all bytes of data is transmitted with data
a) Even parity b) odd parity
c) check scans d) cyclic redundancy

91. Mark out transferred electron device in the following-
a) BARITT diode b) IMPATT diode
c) Gunn diode d) Step recovery diode

92. For a reciprocity network in the scaffering matrix, S
a) $s_{ij} \neq s_{ji}$ b) $s_{ij} = s_{ji}$ c) $s_{ji} = s_{ij}$ d) $s_{ii} = s_{ji}$

93. Isolator is made of
a) Non-ferrite b) ferrite c) Si d) Ge

94. 100mW of power is equal to
a) 50dB b) 10dB c)20dBm d)10dBm

95. Routing is the function of
a) network layer b) transport layer c) Physical layer d) a & c

96. Channel capacity of Shannon's limit for information capacity is _____.
a) $c = B\log_2(1+N/S)$ bits/sec b) $c = B\log_2(S+N)$ bits/sec
c) $c = B\log_2(1+S/N)$ bits/sec d) $c = B/\log_2(1+N/S)$ bits/sec

97. In frequency modulation, if the amplitude of the modulation voltage is doubled, the maximum frequency deviation
a) doubles b) becomes four times
c) becomes half d) remains unchanged

98. Which of the following is the transmission frequency in optical fibre?
a) 10^9Hz b) 10^{11}Hz c) 10^{14}Hz d) None

99. A certain fiber-optic cable has the following characteristics: $n_1 = 1.5$ and $n_2 = 1.48$. What is the value of θ_c?
a) 8.06º b) 80.6º c) 9.4º d)94º

100. A UDP protocol provides _____ service for application level procedures
a) Connection establishment b) connection oriented
c) Connection termination d) connectionless

Instrumentation And Control Engineering (Section Code-05)

1. If $3x + 2y + z = 0,\ x + 4y + z = 0,\ 2x + y + 4z = 0$ be a system of equations, then
   a) It is incomsistent
   b) It has only trivial solution $x = 0, y = 0, z = 0$
   c) It can be reduced to a single equation and so a solution does not exist
   d) determinant of the matrix of coefficients is Zero

2. If 7 and 2 are two roots of the follwing equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then its third root is
   a) -9 b) 14 c) $\frac{1}{2}$ d) 2

3. The solution of $y'' = x + e^x,\ x \in R,\ y(0) = 1,\ y'(0) = 4\ is$
   a) $y = \frac{1}{2}x^2 + x + e^x$ b) $y = \frac{x^3}{3} + \frac{x^2}{2} + e^x$
   c) $y = \frac{1}{6}x^3 + 3x + e^x$ d) $y = x^3 + x^2 + x + e^x$

4. The area of the region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is
   a) 3π b) 4π c) 6π d) 36π

5. In an experiment the success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is
   a) $\frac{64}{729}$ c) $\frac{192}{729}$ c) $\frac{496}{729}$ d) $\frac{240}{729}$

6. Directional derivative of $f = xyz$ at the point (1,-1,-2) in the direction of the vector $2\bar{\imath} - 2\bar{\jmath} + \bar{k}$ is
   a) $\frac{7}{6}$ b) $\frac{7}{3}$ c) 1 d) $\frac{11}{6}$

7. If $u = x^2 + y^2 + z^2$ and $\bar{v} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ then div $(u\bar{v})$ is equal to
   a) 5*u* b) 6*u* c) 0 d) -*u*

8. The particular Integral of the differential equation $(D^3 - D)y = e^x + e^{-x}, D = \frac{d}{dx}$ is
   a) $\frac{1}{2}(e^x + e^{-x})$ b) $\frac{1}{2}x(e^x + e^{-x})$ c) $\frac{1}{2}x^2(e^x + e^{-x})$ d) $\frac{1}{2}x^2(e^x - e^{-x})$

9. If $2x - x^2 + ay^2$ is to be harmonic, then *a* should be
   a) 1 b) 2 c) 3 d) 0

10. Which of the following equation is parabolic ?
    a) $fxy - fx = 0$ b) $fxx + 2fxy + fyy = 0$ c) $fxx + 2fxy + 4fyy = 0$
    d) none

11. Conductors, Semiconductors and Insulators can be easily classified on the basis of
    a) Melting Point b)Band Gap Energy
    c) Relative Permitivity d) Conductivity

12. Built in potential in a p-n junction
    a) Increases with temperature
    b) Increases with doping leads
    c) Equals to difference between the Fermi levels of two sides
    d) Equal to average of Fermi levels of two sides

13. In a semiconductor, Fermi level is proportional to
    a) N b) N^2 c) $N^{2/3}$ d) $N^{3/2}$

14. In Ge at T=300K, the donor concentration are $N_d=10^{14}$ cm^{-3} with $N_a=0$; the Fermi energy level with respect to intrinsic Fermi level is
    a) 0.0383eV b) 0.08eV c) 0.33eV d) 0.15eV

15. Order of electrical conductivity of pure Si, GaAs, Cu, NaCl at room temperature is
    a) Cu>GaAs>Si>NaCl b) NaCl>Si>GaAs>Cu
    c) Cu>NaCl>GaAs>Si d) Cu>Si>GaAs>NaCl

16. The cross section area of Si bar is 100μm^2. The length of bar is 1mm. The bar is doped with arsenic atoms of concentration 5X$10^{16}$$cm^{-3}$. The resistance of the bar is
    a) 2.58mΩ b) 9.26kΩ c) 11.36kΩ d) 24.8kΩ

17. Dynamic resistance of a diode varies as
    a) I^{-2} b) I^{-1} c) I d) I^2

18. Zener breakdown results at around
    a) Better noise immunity b) Forward bias below 6V
    c) Reverse bias above 6V c) Reverse bias below 6V

19. NMOS are better than PMOS because
    a) Better noise immunity b) Faster
    c) TTL Compatability d) Better drive capability

20. Exclusive OR is an
    a) Even function b) Odd function
    c) Equivalence function d) None of the above

21. Simplified form of Boolean function F(A,B,C)= A'B + ABC' + A'BC' + ABC is
    a) A'B+AC b) A'B+AC' c) A'B+AB d) A'B+AB'

22. Karnaugh Map is used to
    a) Minimize the number of flipflops in a digital circuit
    b) Minimize the number of gates only in digital circuit
    c) Minimize the number of gates and fan in of a digital circuit
    d) Design gates

23. If SPP be speed power product for IC, then which one is correct?
    a) Low SPP is desirable b) Optimum SPP is desirable
    c) High SPP is desirable d) None of these

24. The typical fan-out of standard TTL is
a) 6 b) 10 c) 12 d) 14

25. Two 3X8 decoder can be combined to form a
a) 6X16 decoder b) 6X16 demux c) 4X16 decoder d) None of these

26. What is the Gray Code for 1101?
a) 1111 b) 1011 c) 1001 d) 0101

27. For which of the following options can a PLA be used?
a) As a microprocessor b) As a dynamic memory
c) To realize a sequential logic d) To realize a combinational logic

28. Complete the following sentence:
Synchronous Counters are _____ than ripple counters
a) Faster b) Slower c) Same Speed d) None of these

CONTROL SYSTEMS

29. The system with the transfer function G(s)=1-s/s(s+2) is operated in closed loop with unity feedback. The closed loop system is
a) Stable b) Unstable
c) Marginally Stable d) Conditionally Stable

30. The open loop transfer function of a unity feedback system is $G(s)=1/(s+2)^2$
The closed loop transfer function will have poles at
a) -2, -2 b) -2, -1 c) $-2 \pm j1$ d) -2, 2

31. A system has a single pole origin, its impulse response will be
a) Constant b) Ramp c) Decaying Exponential d) Oscillatory

32. Which one of the following is the transfer function of a linear system whose output is t^2e^{-t} for a unit step input?
a) $s/(s+1)^3$ b) $2s/(s+1)^3$ c) $1/s^2(s+1)$ d) $2/s(s+1)^2$

33. The steady state error for type-2 system for unit ramp input is
a) 0 b) ∞ c) $1/K_a$ d) $1/K_v$

34. Effect of adding a zero to a transfer function is
a) To rotate the high frequency portion of the polar plot by 90® in counter clockwise direction.
b) To rotate the high frequency portion of the polar plot by 90® in clockwise direction.
c) Further rotation of polar plot through an angle of 90® as w→
d) Null

35. Among the systems responding without oscillation, a_____ system exhibits the fastest response
a) Over damped b) Under damped c) Critically damped d) Undamped

36. If the gain of an open-loop system is doubled, the gain margin
a) is not affected b) gets doubled c) becomes left d) becomes one-fourth

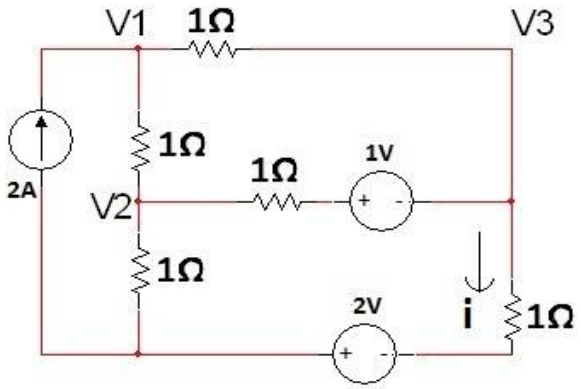
37. For a system to be stable, gain crossover must occur _____ phase crossover
a) prior to b) after c) simultaneously with
d) in direct proportion to

38. A circuit with 'n' nodes and 'b' branches requires at least
a) n-1 independent loop equation
b) 'b' independent loop equation
c) n+b independent loop equation
d) b-n+1 independent loop equation

39. The current at a given point in certain circuit is given as function of time as i(t)=-3+t, the total charge passing through a point between t=99 seconds and t=102 seconds is
a) 292.5 b) 293.5 c) 192.5 d) 193.5

40. Which of the following statement is true for a delayed step function u(t-1)?
a) It has a finite fourier series b) It has an infinite fourier series
c) It does not have fourier series d) None of these

41. What is value of i?

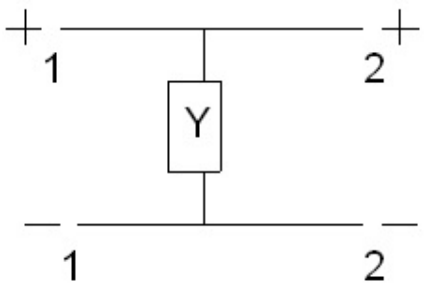


a) 1.5A b) 0.5A c) 1A d) 2A

42. Which of the statements is true while using super position theorem?
a) It is a dual of Thevenin Theorem
b) Voltage contribution due to individual sources at nodes can be found by this theorem
c) A voltage source is replaced as open circuit
d) A current source is replaced as short circuit

43. In delta connected circuit when one resistor is open, the power will be
a) 0 b) Increased by the factor of 3
c) Reduced by the factor of 3 d) Unchanged

44. For the linear time-invariant two port network shown in the figure, the admittance matrix [y] will be



a) $\begin{bmatrix} y & -y \\ -y & y \end{bmatrix}$ b) Null matrix c) $\begin{bmatrix} y & 0 \\ 0 & y \end{bmatrix}$ d) Indeterminate

45. The transformer cannot be described by
a) h-parameters b) ABCD parameters c) g-parameters d) z-parameters

46. Transfer function= $4(s^2+25) / s^2+2.5s+100$ is of a
a) low pass notch filter b) low band pass filter
c) high band pass filter d) high pass notch filter

47. Clamping circuit depends mostly on
a) Capacitance of the circuit b) Time constant of the circuit
c) Resistance of the circuit d) None of these

48. Bridge rectifier is normally avoided
a) In high voltage rectification b) In low voltage rectification
c) In all types of voltage rectification d) In square wave rectification

49. β of a transmitter
a) Decreases with increase of temperature
b) Increases with increase of temperature
c) C. Remains same with increase of temperature
d) None of these

50. For a MOSFET the input resistance is
a) 10^9-10^{10} Ω b) 10^{12}-10^{15}Ω c) 1MΩ d) 100Ω

51. Introducing a resistor in the emitter of a common emitter amplifier stabilizes the D.C operating point against variations in
a) only temperature b) only β of transistor
c) Both temperature and β d) None of these

52. An n-channel JFET has I_{DSS}=2mA & V_P=-4V & V_{GS}=-2V. Find Transconductance
a) 0.25 mho b)0.5m mho c) 0.75µ mho d)1m mho

53. An amplifier has an open loop gain of 100, an input impedance of 1KΩ, output impedance of 100Ω, β=0.99=feedback factor. Feedback is in voltage series mode. Find new input impedance and output impedance.
a) 1KΩ,100Ω b) 100KΩ,100Ω c) 1000KΩ,1Ω d) None of these

54. In transistor amplifier CE mode is preffered because it provides
a) Less energy loss b) More circuit balance
c) Both voltage and current gain d) Nome of these

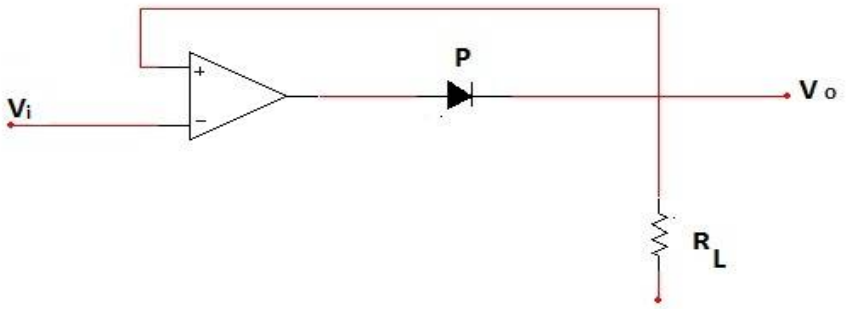
55. A common source JFET amplifier has a load resistance R_L=500KΩ, r_d=100KΩ & μ=24. The voltage gain is
a) 30 b) 25 c) 20 d) None of these

56. An ideal op-amp has
a) Infinite output impedence b) Zero output impedence
c) Low voltage gain d) Zero input impedence

57. A positive half wave rectifier using op-amp is generally used to rectify signal of the order of
a) kilovolts b) hundreds of volts c) tens of volts d) a few milivolts

58. An opamp Schmitt trigger is basically
a) an opamp comparator with negative feedback
b) an opamp comparator with positive feedback
c) a triangle wave generator
d) a pulse generator

59. The given circuit forms



a) Active positive clipper b) Active peak detector
c) Active half wave rectifier d) Sample & hold circuit

60. In an opamp, the slewing rate is the maximum time rate of change of the closed loop:
a) Output voltage when supplying the rated output
b) Output voltage under small signal condition

c) Input voltage under large signal condition
d) Input voltage under small signal condition

61. An oscillator is basically an amplifier with
a) zero gain b) very large gain c) infinite gain d) very low gain

62. An Op-amp comparator basically converts an input voltage into a
a) square wave voltage b) triangle wave voltage
c) ramp voltage d) sinusoidal voltage

63. An opamp clamper
a) Removes part of the output voltage above a given level
b) Converts the input voltage into a square wave voltage at agiven level
c) Clamps the output voltage at a given level
d) Removes part of output voltage below a given level

64. An opamp limiter generally limits the output voltage at
a) Reference level determined by V_{CC}
b) Reference level determined by $-V_{EE}$
c) Level (V_2+V_D) & $-(V_2+V_D)$
d) r.m.s. values of input voltages

65. The instrument with null output is
a) Pirani gauge b) Thermometer
c) Rotameter d) A platform of weighing machine

66. Which of the following is not a self-generating type of transducer?
a) LVDT b) Thermocouple
c) Photo-voltaic Cell d) Piezo Electric Crystal

67. The value of gauge factor for a semiconductor strain gauge used in practice can be approximately
a) 150 b) 4.2 c) 0.62 d) 2.07

68. Which material can generate emf when subjected to mechanical strain?
a) Strain gauge sensor b) Steel wire
c) Piezoelectric material d) Thermocouple

69. At what temperature do the Fahrenheit and Celsius scale coincide?
a) 40˚C b) -40˚C c) 20˚C d) -20˚C

70. Which electrical type flowmeter can be used for all types of fluids?
a) Turbomagnetic b) Electromagnetic c) Hot Wire d) Ultrasonic

71. A 0-15Ampere ammeter has an accuracy of ±0.8%. What is the accuracy when measuring a current of 5 A?
a) ±2.16% b) ±1.4% c) ±2.4% d) ±3.4%

72. A balloon carrying a first-order thermometer with a 25s time constant, rises through the atmosphere at the rate of 20ms. Assume that temperature decreases with altitude at the rate of 0.7®C/100m. The balloon transmits temperatures and altitude readings back to the ground) At 5000m, the balloon stays the temperature is 20®C. What is the true altitude at which 20® occurs?
a) 5000 b) 6000 c) 5500 d) 6050

73. The bandwidth of an electrocardiogram (ECG) amplifier is
a) 0 to 0.01Hz b) 0.05 to 500Hz c) 550 to 1500Hz d) 2000 to 10000Hz

74. _____ is used to measure low temperature
a) Thermocouple b) Thermistor
c) Semiconductor Thermometer d) Optical Pyrometer

75. To obtain good contact between the electrode and the skin, the gap is filled with an electrode paste containing
a) Electrolytes b) Wad c) Glycerine d) Iodine

76. EMG deals with
a) Study of brain activity b) Study of Myocardial activity
c) Study of muscular activity d) Study of central nervous system

77. The commonest source of energy in pacemaker is the
a) Mercury battery b) the ordinary dry cell
c) Nuclear battery d) Solar cell

78. Among the following things which have the highest attenuation of ultrasound?
a) Blood b) Bone c) Fat d) Muscle

79. Blood flow can be measured using the electromagnetic principle because blood has a high
a) Magnetic Induction b) Electrical Resistivity
c) Electrical Conductivity d) Impedence

80. A position control system is
a) A stochastic control system b) A process control system
c) A servomechanism d) An automatic regulatory system

81. A synchro transmitter receiver unit is a
a) DC device b) Two phase AC device
c) Three phase AC device d) Single phase AC device

82. The purpose of series quadrature windings in an amplidyne is to
a) Increase the gain
b) Increase the response time
c) Reduce the commutation difficulties

d) Neutralize the effect of armature reaction

83. An ON-OFF controller is
a) P Controller b) Integral(I) controller
c) P-I Controller d) PID Controller

84. The team 'rest control' refers to
a) Integral control b) Derivative control
c) Proportional control d) None of the above

85. Identify the open- loop system from the following
a) A man driving a scooter
b) A Socialistic system
c) A man in Spaceship
d) Room air conditioner with a thermostat

86. The deflectin torque of a moving iron instrument is proportional to

a) I b) I^2 c) I^3 d) I^4

87. Nano voltmeters (nvM) and digital multimeters(DMM) have input impedance about
a) $10T\Omega$ b) $200M\Omega$ c) $50K\Omega$ d) $10G\Omega$

88. For high current measuremts in the range of few amperes, which digital meter is not suitable?
a) DMMS b) SMU c) Source meter Instruments
d) Electrometer

89. Phase sequence indicators are two types, one in static type, another is
a) Dynamic b) Rotating type c) Sequential type
d) None of these type

90. Calculate the maximum velocity if the beam of electron in a CRT having a cathode node voltage of 800V. Assume that the electron to leave the cathode with zero velocity. Charge of electron = 11.6×10^{-19} c and mass of electron = 9.1×10^{-31} kg;
a) 16.8×10^3 m/s b) 17.5×10^3 m/s c) 1000 m/s d) 9.1×10^3 m/s

91. A set of readings has a wide range and therefore it has
a) Low precision b) High precision
c) Low accuracy d) High accuracy

92. A temperature measurement instrument is calibrated between 100° C to 600° C. The scale span of the instrument is
a) 600° C b) 100° C c) 700° C d) 500° C

93. Uncertainty distribution is used for

a) Analysis of multi-sample data
b) Analysis of single sample data
c) Analysis of both single and multi sample data
d) None of the above

94. For which of the following are peripherals used?
a) To ensure the security of the system
b) To expand the computer's capabilities
c) To ensure the secrecy of the program
d) None of the above

95. Complete the following question:
A Microprocessor with 12 address lines is capable of addressing _____ locations
a) 1024 b) 2048 c) 4096 d) 64

96. The flow and timing of data to and from the microprocessor is regulated by
a) Control pins b) Address pins
c) Data pins d) Power pins

97. An interrupt which can be temporarily ignored by the counter is know as
a) Vectored interrupt b) Non-Maskable interrupt
c) Maskable interrupt d) Low priority interrupt

98. Functions of RIM
a) To read interrupt masks b) To Identify pending interrupts
c) To receive serial data d) All of these

99. Complete the following statement
XCHG is a _____ byte instruction in which contents of _____ , _____ are exchanged with contents of _____ , _____ respectively
a) 2, D, E, H, L b) 2,H, L, D, E
c) 3, B, C, D, E d) 1, H, L, D, E

100. Complete the following sentence
8085 has _____ interrupts of which TRAP has highest priority with call location _____
a) 3, 0024 H b) 4, 0036 H
c) 4, 0024 H d) 5, 0024 H

CSE (Section Code – 06)

1. If $3x + 2y + z = 0,\ x + 4y + z = 0,\ 2x + y + 4z = 0$ be a system of equations, then
   a) It is incomsistent
   b) It has only trivial solution $x = 0, y = 0, z = 0$
   c) It can be reduced to a single equation and so a solution does not exist
   d) determinant of the matrix of coefficients is Zero

2. If 7 and 2 are two roots of the follwing equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then its third root is
   a) -9 b) 14 c) $\frac{1}{2}$ d) 2

3. The solution of $y'' = x + e^x,\ x \in R,\ y(0) = 1,\ y'(0) = 4\ is$
   a) $y = \frac{1}{2}x^2 + x + e^x$ b) $y = \frac{x^3}{3} + \frac{x^2}{2} + e^x$
   c) $y = \frac{1}{6}x^3 + 3x + e^x$ d) $y = x^3 + x^2 + x + e^x$

4. The area of the region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is
   a) 3π b) 4π c) 6π d) 36π

5. In an experiment the success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is
   a) $\frac{64}{729}$ c) $\frac{192}{729}$ c) $\frac{496}{729}$ d) $\frac{240}{729}$

6. Directional derivative of $f = xyz$ at the point (1,-1,-2) in the direction of the vector $2\bar{\imath} - 2\bar{\jmath} + \bar{k}$ is
   a) $\frac{7}{6}$ b) $\frac{7}{3}$ c) 1 d) $\frac{11}{6}$

7. If $u = x^2 + y^2 + z^2$ and $\bar{v} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ then div $(u\bar{v})$ is equal to
   a) 5*u* b) 6*u* c) 0 d) -*u*

8. The particular Integral of the differential equation $(D^3 - D)y = e^x + e^{-x}, D = \frac{d}{dx}$ is
   a) $\frac{1}{2}(e^x + e^{-x})$ b) $\frac{1}{2}x(e^x + e^{-x})$ c) $\frac{1}{2}x^2(e^x + e^{-x})$ d) $\frac{1}{2}x^2(e^x - e^{-x})$

9. If $2x - x^2 + ay^2$ is to be harmonic, then *a* should be
   a) 1 b) 2 c) 3 d) 0

10. Which of the following equation is parabolic?
    a) $fxy - fx = 0$ b) $fxx + 2fxy + fyy = 0$ c) $fxx + 2fxy + 4fyy = 0$
    d) none

11. Read the following algorithm:
    FUNCTION ABC(X,Y)
    WHILE (X≠Y)

IF (X>Y) THEN
X←X-Y
ELSE
Y←Y-X
RETURN(X)
END OF FUNCTION ABC
The FUNCTION ABC finds

a) GCD
b) prime integer
c) LCM
d) Both GCD and LCM

12. Which of the following is tautology?

a) $(p \vee q) \rightarrow p$
b) $p \vee (q \rightarrow p)$
c) $p \vee (p \rightarrow p)$
d) $p \rightarrow (q \rightarrow p)$

13. The number of binary relations on asset with n elements is

a) n^2
b) 2^n
c) $2n^2$
d) $2\ n^3$

14. Let R be non empty relations on a collection of acts defined by A R B if and only if A=B. Then

a) R is reflexive and transitive
b) R is symmetric and non-transitive
c) R is an equivalence relation
d) R is not reflexive

15. Which of the following is TRUE for an abelian group (G,O) ?

a) $g = g^{-1}$ for every $g \in G$
b) $g=g^2$ for every $g \in G$
c) $(g \circ h)^{-2} = g^2 \circ h^2$ for every $g, h \in G$
d) G is of finite order

16. If a and b are positive integers defining a*b=a where a,b = α (modular 7), with this operation, the inverse of 3 in a group G { 1,2,3,4,5,6} is

a) 3 b) 1 c) 5 d) 4

17. The minimum number of edges in a connected graph with n vertices

a) n-1 b) n c) n+1 d) n^2

18. The number of distinct sample graphs with upto 3 nodes is

a) 15 b) 10 c) 7 d) 9

19. A graph requires k different colors for its proper coloring number of the vertices of every planar graph is

a) 1 b) k c) k-1 d) k/2

20. In any undirected graph, the sum of the degrees of all vertices
    a) must be even
    b) is twice the number of edges
    c) must be odd
    d) Both a) and b)

21. What type of circuit is used at the interface point of an output port?
    a) decoder b)Latch
    c) tristate buffer d) None of the above

22. I/O mapped systems identify their input/output devices by giving them a(n) ___.
    a) 8-bit port number
    b) 16-bit port number
    c) 8-bit buffer number
    d) 8-bit instruction

23. How many bits are used in the address bus?
    a) 7 b) 8 c) 9 d) 16

24. Which interrupt has the highest priority?
    a) INTR (b TRAP c) RST6.5 d) a& b

25. What are level Triggering interrupts?
    a) INTR&TRAP b) RST6.5&RST5.5
    c) RST7.5&RST6.5 d) RST 5 and RST 6

26. Which are software interrupts?
    a) RST 0 – 7 b) RST 5.5 - 7.5
    c) INTR, TRAP d) both a) and b)

27. Why is 8085 processor called an 8 bit processor?
    a) Because 8085 processor has 8 bit ALU.
    b) Because 8085 processor has 8 bit data bus.
    c) a & b.
    d) Because 8085 processor has 8 bit address bus

28. In 8086, example for Non maskable interrupts are
    a) Trap b) RST 6.5 c) INTR d) RST 5

29. Can ROM be used as stack?
    a) Yes b) No c) sometimes yes, sometimes no
    d) cant say

30. Which processor structure is pipelined?
    a) all x80 processors
    b) all x85 processors
    c) all x86 processors

d) all x87 processors

31. BHE of 8086 microprocessor signal is used to interface the
    a) Even bank memory
    b) Odd bank memory
    c) I/O
    d) DMA

32. 8088 microprocessor differs with 8086 microprocessor in
    a) Data width on the output
    b) Address capability
    c) Support of coprocessor
    d) Support of MAX / MIN mode

33. Which is Address line for TRAP ?

    a) 0023H b) 0024H c) 0033H d) 0044H

34. In 8086 microprocessor the following has the highest priority among all type interrupts.

    a) NMI b) DIV 0 c) TYPE 255 d) OVER FLOW

35. How many address lines are needed to address each memory locations in a 2048 x 4 memory chip?
    a) 10 b) 11 c) 8 d) 12

36. In immediate addressing the operand is placed
    a) in the CPU register
    b) after OP code in the instruction
    c) in memory
    d) in stack

37. Microprocessor 8085 can address location upto
    a) 32K b) 128K c) 64K d) 1M

38. The ALU and control unit of most of the microcomputers are combined and manufactured on a single silicon chip. What is it called?
    a) mono chip
    b) microprocessor
    c) ALU
    d) control unit

39. When the RET instruction at the end of subroutine is executed,
    a) the information where the stack is iniatialized is transferred to the stack pointer
    b) the memory address of the RET instruction is transferred to the program counter

c) two data bytes stored in the top two locations of the stack are transferred to the program counter
d) two data bytes stored in the top two locations of the stack are transferred to the stack pointer:

40. Which of the following operations is performed by a microprogram?
a) read b) write c) read and write d) read and execute

41. What is the control unit's function in the CPU?
a) To transfer data to primary storage
b) to store program instruction
c) to perform logic operations
d) to decode program instruction

42. The most common addressing techniques employed by a CPU is
a) immediate b) direct
c) register d) all of the above

43. Pipeline implements
a) fetch instruction
b) decode instruction
c) fetch operand
d) all of above

44. Consider a disk drive with the following characteristics:
7200 revolutions per minute rotation speed
7 msec average seek time
256 sectors per track, with 512 bytes per sector
2048 tracks per surface
16 surfaces
1 head per surface, all heads move together as a group
reading and writing cannot be done at the same time
What is the total capacity of the disk drive?

a) 15.7 MB/sec b) 15.0 MB/sec c) 25.7 MB/sec d) 15.2 MB/sec

45. A number of disks, a CPU, and the main memory are all connected to the same 10 MHz 32-bit bus. The disk has a transfer rate of 2 MBytes/sec. The CPU and main memory can both keep pace with the bus. How many disks can be simultaneously transmitting?

a) 0.5 disks/bus b) 2 disks/bus
c) 1disks/bus d) no simultaneous transmission

46. A memory has 2^{24} addressable locations. What is the smallest width in bits that the address can be while still being able to address all 2^{24} locations?

a) 48 b) 2^{24} c) 24 d) 1

47. Four 256-word × 8-bit PROM chips are used to produce a total capacity of 1024-word × 8-bits. How many address bus lines are required? (Circle one.)
a) 4 b) 8 c) 10 d) 16

48. Which one of the following assembler is exclusively used in DOS OS?
a) TASM b) FASM c) WASM d) OPTASM

49. Round robin scheduling is essentially the preemptive version of _____.
a) FIFO b)Shortest job first
c) Shortest remaining d) Longest time first

50. Which file system does Windows 95 typically use?
a) FAT16 b) FAT32 c) NTFS d) LMFS

51. Which page replacement alogorithm suffers from Belady's anamoly?
a) LRU b)MRU c) FIFO d) LIFO

52. The problem of fragmentation arises in
a) Static storage allocation
b) Stack allocation storage
c) Stack allocation with dynamic binding
d) Heap allocation

53. Which checks whether the program is correctly written in terms of the programming language syntax and semantics in a compiler?
a) middle end b) front end
c) back end d) Operating system

54. The list of processes and their corresponding CPU burst time are listed in the following table:

Process	CPU burst time (mill sec)
P1	5
P2	24
P3	16
P4	10
P5	3

If the Shortest Job First Scheduling is used, the average waiting time is

a) 12.6 millisec b) 63 millisec c) 24 millisec d) 35 millisec

55. Consider the request queue (80,66,72,87). If the head of read / write head starts at 60, the sequence of the head movement as per SSTF scheduling is as follows:
a) 87,80,72,66 b) 66,72,80,87 c) 80,66,72,87 d) undetermined

56. To avoid race condition, the number of processes that may be simultaneously inside their critical section is
a) 0 b) 1 c) 2 d) 4

57. What is the maximum memory address spca that the processor each accessing directly if it is connected to 16 bit memory?
a) 2^{16}-1 b) 2^{16} c)16^2 d) 16^2-

58. In which of the storage placement strategies is a program placed in the available hole in the main memory?
a) best fit b) first fit c) worst fit d) buddy

59. Thrashing
a) Reduces page I/O
b) Decreases the degree of multiprogramming
c) Implies excessive page I/O
d) Improves system performance

60. An operating system contains 3-users process each requiring 2 units of resource R. The minimum number of the units of R such that no dead locks will ever arise is
a) 3 b) 5 c) 4 d) 6

61. Which one of the following assembler is exclusively used in Windows?
a) TASM b) GoAsm c) WASM d) OPTASM

62. Small Talk and Java systems use the following compiler type
a) Source to source compiler b) One pass compiler
c) Just-in-time compiler d) stage compiler

63. Consider an operating system capable of loading and executing a single sequential user process at a time. The disk head scheduling algorithm used is First Come First Served (FCFS). If FCFS is replaced by Shortest Seek Time First (SSTF), claimed by the vendor to give 50% better benchmark results, what is the expected improvement in the I/O performance of user programs?
a) 50% b) 40% c) 25% d) 0%

64. The best data structure to check whether an arithmetic expression has balanced parentheses is a
a) queue b) stack c) tree d) list

65. A Priority-Queue is implemented as a Max-Heap. Initially, it has 5 elements. The level-order traversal of the heap is given as follows:10, 8,5,3,2. Two new elements 1 and 7 are inserted in the heap in that order. The level-order traversal of the heap after the insertion of the elements is
a) 10,8,7,5,3,2,1 b) 10,8,7,2,3,1,5

c) 10,8,7,1,2,3,5 d) 10,8,7,3,2,1,5

66. How many distinct binary search trees can be created out of 4 distinct keys?
a) 5 b) 14 c) 24 d) 42

67. The Worst case occur in linear search algorithm when
a) Item is somewhere in the middle of the array
b) Item is not in the array at all
c) Item is the last element in the array
d) Item is the last element in the array or is not there at all

68. The complexity of the average case of an algorithm is
a) Much more complicated to analyze than that of worst case
b) Much more simpler to analyze than that of worst case
c) Sometimes more complicated and some other times simpler than that of worst case
d) None or above

69. Arrays are best data structures
a) for relatively permanent collections of data
b) for the size of the structure and the data in the structure are constantly changing
c) for both of above situation
d) d) for none of above situation

70. The time factor when determining the efficiency of algorithm is measured by
a) Counting micro seconds
b) Counting the number of key operations
c) Counting the number of statements
d) Counting the kilobytes of algorithm

71. Post-order traversal of a given binary search tree, T produces the following sequence of keys (10, 9, 23, 22, 27, 25, 15, 50, 95, 60, 40, 29). Which one of the following sequences of keys can be the result of an in-order traversal of the tree T?
a) 9, 10, 15, 22, 23, 25, 27, 29, 40, 50, 60, 95
b) 29, 15, 9, 10, 25, 22, 23, 27, 40, 60, 50, 95
c) 9, 10, 15, 22, 40, 50, 60, 95, 23, 25, 27, 29
d) 95, 50, 60, 40, 27, 23, 22, 25, 10, 9, 15, 29

72. The following numbers are inserted into an empty binary search tree in the given order: 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree (the height is the maximum distance of a leaf node from the root)?
a) 2 b) 3 c) 4 d) 6

73. What is the value returned by the function `Do Something' when a pointer to the root of a non-empty tree is passed as argument ?
a) The number of leaf nodes in the tree
b) The number of nodes in the tree
c) The number of internal nodes in the tree

d) The height of the tree

74. The indirect change of the values of a variable in one module by another module is called
a) internal change b) inter-module change
c) side effect d) side-module update

75. Which of the following products was an early implementation of the relational model developed by E.F. Codd of IBM?
a) IDMS b)DB2 c) dBase II d) R-Base

76. When the values in one or more attributes being used as a foreign key must exist in another set of one or more attributes in another table, we have created a(n)
a) transitive dependency. b) insertion anomaly
c) referential integrity constraint d) normal form

77. A functional dependency is a relationship between or among:
a) tables. b) Rows c)relations d) attribute

78. If attributes A and B determine attribute C, then it is also true that:
a) $A \rightarrow C$ b) $B \rightarrow C$
c) (A,B) is a composite determinant d) C is a determinant

79. Which type of entity has its relationship to another entity determined by an attribute in that other entity called a discriminator?
a) Super type entity b) Sub type entity
c) Arche type entity d) Instance entity

80. Which of the following occurs when a transaction rereads data and finds new rows that were inserted by a command transaction since the prior read?
a) Non-repeatable read b) Phantom read
c) Dirty read d) Consistent read

81. Which of the following disallows both dirty reads and nonrepeatable reads, but allows phantom reads?
a) Read committed b) Read uncommitted
c) Repeatable read d)Serializable

82. Which is not a relevant feature of CASE tools?
a) The ability to help draw data models using entity-relationship notations
b) The ability to generate code
c) An information repository d) Access to a DB via the Internet

83. The transaction allowed to occur by a shared lock is
a) Mdelwete b) insert c) read d) update

84. Each answer below shows example data from a table. Which answer is an example of the inconsistent values problem?
    a) Three rows have the values Brown Small Chair, Small Chair Brown, and Small Brown Chair in the same column
    b) Three columns have the values 534-2435, 534-7867, and 546-2356 in the same row.
    c) Three rows have the values Brown, NULL, and Blue in the same column \
    d) One row has the value "He is interested in a Silver Porsche from the years 1978-1988" in a column.

85. Which of the following functions does the ODBC core API consist of?
    a) Commit or rollback transactions only
    b) Connect to data sources with driver-specific information only
    c) Connect to data sources only
    d) Both 1 and 3 above are in the OBDC core API

86. Consider the following relation schema pertaining to a students database:
    Student (rollno, name, address)
    Enroll (rollno, courseno, coursename)
    where the primary keys are shown underlined. The number of tuples in the Student and Enroll tables are 120 and 8 respectively. What are the maximum and minimum number of tuples that can be present in (Student * Enroll), where
    ***** denotes natural join?
    a) 8, 8 b) 120, 8 c) 960, 8 d) 960, 120

87. Packets of the same session may be routed through different paths in
    a) TCP, but not UDP b) TCP and UDP
    c) UDP, but not TCP d) Neither TCP, nor UDP

88. An organization has a class B network and wishes to form subnets for 64 departments. The subnet mask would be
    a)255.255.0.0 b) 255.255.64.0 c) 255.255.128.0 d) 255.255.252.0

89. Suppose the round trip propagation delay for a 10 Mbps Ethernet having 48-bit jamming signal is 46.4 μs. The minimum frame size is:
    a) 94 b) 416 c) 464 d) 512

90. In a packet switching network, packets are routed from source to destination along a single path having two intermediate nodes. If the message size is 24 bytes and each packet contains a header of 3 bytes, then the optimum packet size is
    a) 4 b) 6 c) 7 d) 9

91. In a network of LANs connected by bridges, packets are sent from one LAN to another through intermediate bridges. Since more than one path may exist between two LANs, packets may have to be routed through multiple bridges.
    a) For shortest path routing between LANs
    b) For avoiding loops in the routing paths

c) For fault tolerance d) For minimizing collisions

92. The length of a port address in TCP / IP is.
a) 32 bits b) 48 bits c)16 bits d)6 4 bits

93. Which address of a station on the same network does bridge have access to?
a) Logical b) Physical c)Port d)Data link

94. To communicate with a remote host, a mobile host goes through _____ phases.
a)Three b) Two c) Four d) Five

95. A mobile host that has moved to the same network (or site) as the remote host.
a) Triple crossing b) Double crossing
c) Triangular routing d) Flooding

96. BOOTP is a possible solution to the problem
a) Host IP address must be changed if he moves from one network to another
b) The limited address space
c) All hosts addresses must be changed if class B networks grows too large
d) All hosts addresses must be changed at least once a year

97. Which of the following is not provided by DHCP
a) IP address b) ARP tables
c) subnet mask d) DNS server address

98. How many OSI layers are covered in the X.25 standard?
a) 2 b) 3 c) 7 d)6

99. In symmetric key algorithm, a 12 input line P-box is to be mapped with a S-box to form the next stage. The number of cross wires needed in the middle stage in this mapping is
a) 12 b) 4096 c) 24 d) 144

100. If the ISP 128.211.0.0 / 16 is allotted to an organization, the organization can assign up to
a) 2^{24} host addresses b) 2^{16} host address
c) 2^{4} host addresses d) any number of host addresses

Chemical (Section Code – 07)

1. If $3x + 2y + z = 0,\ x + 4y + z = 0,\ 2x + y + 4z = 0$ be a system of equations, then
   a) It is incomsistent
   b) It has only trivial solution $x = 0, y = 0, z = 0$
   c) It can be reduced to a single equation and so a solution does not exist
   d) determinant of the matrix of coefficients is Zero

2. If 7 and 2 are two roots of the follwing equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then its third root is
   a) -9 b) 14 c) $\frac{1}{2}$ d) 2

3. The solution of $y'' = x + e^x,\ x \in R,\ y(0) = 1,\ y'(0) = 4\ is$
   a) $y = \frac{1}{2}x^2 + x + e^x$ b) $y = \frac{x^3}{3} + \frac{x^2}{2} + e^x$
   c) $y = \frac{1}{6}x^3 + 3x + e^x$ d) $y = x^3 + x^2 + x + e^x$

4. The area of the region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is
   a) 3π b) 4π c) 6π d) 36π

5. In an experiment the success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is
   a) $\frac{64}{729}$ b) $\frac{192}{729}$ c) $\frac{496}{729}$ d) $\frac{240}{729}$

6. Directional derivative of $f = xyz$ at the point (1,-1,-2) in the direction of the vector $2\bar{\imath} - 2\bar{\jmath} + \bar{k}$ is
   a) $\frac{7}{6}$ b) $\frac{7}{3}$ c) 1 d) $\frac{11}{6}$

7. If $u = x^2 + y^2 + z^2$ and $\bar{v} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ then div $(u\bar{v})$ is equal to
   a) 5*u* b) 6*u* c) 0 d) -*u*

8. The particular Integral of the differential equation $(D^3 - D)y = e^x + e^{-x}, D = \frac{d}{dx}$ is
   a) $\frac{1}{2}(e^x + e^{-x})$ b) $\frac{1}{2}x(e^x + e^{-x})$ c) $\frac{1}{2}x^2(e^x + e^{-x})$ d) $\frac{1}{2}x^2(e^x - e^{-x})$

9. If $2x - x^2 + ay^2$ is to be harmonic, then *a* should be
   a) 1 b) 2 c) 3 d) 0

10. Which of the following equation is parabolic ?
    a) $fxy - fx = 0$ b) $fxx + 2fxy + fyy = 0$ c) $fxx + 2fxy + 4fyy = 0$
    d) none

11. Ideal gas law is
    a) PV=nRT

b) $P \alpha 1/V$
c) $P \alpha T$
d) None of the above

12. The value of gas constant R is
a) 0.08206 atm m^3 /kmole K
b) 8.314 J/mole K
c) 8.314 kJ/kmole K
d) All of the above

13. Molarity is defined as
a) No.of gmole of solute/ liter of solution
b) Kg of solute / liter of solution
c) Kmole of solute / kmole of solution
d) Kmole of solute/kg of solvent

14. Specific gravity of the substance is defined as
a) Density of substance/ density of reference substane
b) Viscosity of substance / viscosity of reference substance
c) Moles of substance / moles of water
d) None of the above.

15. The mean molecular weight of air is
a) 21 b) 23
c) 28.95 d) None of the above

16. Which of the following is followed by an ideal solution
a) Boyle's law b) amagat's law
c) Raoult's law d) Trouton's law

17. For a steady state system
a) The rate of input is zero
b) The rate of generation is zero
c) The rate of consumption is zero
d) The rate of accumulation is zero

18. A bypass stream in a chemical process is useful, because it
a) facilitates better control of process
b) improves the conversion
c) increase the yield of products
d) none of these

19. The ultimate analysis of coal gives
a) Carbon, hydrogen and ash
b) Volatile matter, moisture, ash and fixed carbon

c) Carbon, hydrogen, sulphur and nitrogen
d) Volatile matter, moisture, nitrogen and fixed carbon

20. For SO_2 / SO_3 service at 400 ^{0}C the recommended material of construction is
a) Stainless steel
b) Carbon steel
c) Cast steel
d) Monel

21. Catalyst used in contact process of sulphuric acid manufacture is
a) Alumina
b) Iron oxide
c) Vanadium pentoxide
d) Silicon Dioxide

22. The converter of the contact process for the manufacture of H_2SO_4, the equilibrium conversion of SO_2 _____ (i)_____ with increase in the temperature and _____(ii)_____ with increase in mole ratio of SO_2 to air
a) (i) Increase (ii) Decreases
b) (i) Decreases (ii) Increases
c) (i) increases (ii) increases
d) (i) decreases (ii) decreases

23. The ethyl alcohol content in the fermented liquor from molasses, is
a) 50 – 55%
b) 08 – 10%
c) 20 – 22%
d) 03 – 05 %

24. Sucrose is a disaccharide consisting of
a) Glucose and glucose
b) Glucose and fructose
c) fructose and galactose
d) glucose and galactose

25. Which one of the following is not likely to be constituent of vegetable oil?
a) Citric acid
b) Oleic acid
c) Stearic acid
d) Glycerol

26. A bio – degradable detergent is one which
a) Manufactured using biotechnology
b) Contains straight chain alkyl benzenes
c) Contain branch chain alkyl benzenes
d) Is easily decomposed by micro organism

27. Hydrogenation of edible oil is done to
a) Decrease the number of unsaturated bonds
b) Lower the melting point of oil
c) Increase the thermal conductivity of oil
d) Enable the oil to be packed in tin container

28. For the hydrogenation of oils, ___(i)___ is commonly used as catalyst, and __(ii)__
a) (i) Platinum (ii) Sulphur
b) (i) Palladium (ii) Oxygen
c) (i) Nickel (ii) Sulphur
d) (i) Nickel (ii) Oxygen

29. Filter aid is used
    a) to increase the rate of filtration
    b) to decrease pressure drop
    c) to increase porosity of the cake
    d) as a support base for the septum

30. Filter medium resistance is important during
    a) early stage of filtration
    b) final stage of filtration
    c) all along the process
    d) none of these

31. The unit of specific cake resistance is
    a) gm / cm^2
    b) cm / gm
    c) cm / gm^2
    d) gm / gm

32. The most common filter aid is
    a) diatomaceous earth
    b) calcium silicate
    c) sodium carbonate
    d) silica gel

33. Highly viscous liquids and pastes are agitated by
    a) propellers
    b) turbine agitators
    c) multiple blade paddles
    d) none of these

34. In washing type plate and frame filter press, the ratio of the washing rate to the final filtrate rate is
    a) 4
    b) ¼
    c) 1
    d) ½

35. Cake resistance increases steadily with the time of filtration in a plate and frame filter employing constant
    a) Rate of filtration
    b) pressure filtration
    c) Both a) and b) above
    d) None of the above

36. In unbaffled tank, formation of vortex is not desirable because
    a) Very poor mixing between adjacent layers
    b) air be easily entrained in to the liquid even at modest impeller speed

c) the liquid level at the top edge of the tank is raised significantly
d) all the above

37. During agitation power consumption during turbulent flow is proportional to the
a) Density of liquid
b) Viscosity liquid
c) interface tension of liquid
d) thermal conductivity of liquid

38. A horizontal pipeline 30 cm contains carrying oil of specific gravity 0.9 flowing through it, has a venturimeter installed in it with a throat diameter 15 cm. Calculate the oil discharge when the manometer shows 20 cm of mercury difference.
(a) 0.73 m^3/s b) 0.43 m^3/s c) 0.13 m^3/s d) 1 m^3/s

39. For a centrifugal pump if the speed is increased by 4 times, the head.....
a) increases by 4 times
b) decreases by 8 times
c) increases by 16 times
d) decreases by 16 times

40. Cavitation can be prevented by
a) suitably designing the pump
b) maintaining the suction head sufficiently greater than the vapour pressure
c) maintaining suction head = developed head
d) suction head lower than the vapour pressure

41. Differential manometer measures
a) atmospheric pressure
b) sub-atmospheric pressure
c) pressure difference between two points
d) none of these

42. Fluids which show an apparent increase in viscosity with time are called
a) rheopectic b) thixotropic **c)** ideal fluid d) dilatant fluid

43. Usually the discharge coefficient of an orifice is about
a) 0.6 b) 0.7 c) 0.8 d) 0.9

44. Bernoulli's theorem deals with conservation of
a) mass b) force c) momentum d) energy

45. Toothpaste is a
a) Bingham plastic b) Pseudoplastic
c) Newtonian liquid d) Dilatant

46. A globe valve is most suitable for applications in which
a) the valve is required to be either fully open or fully closed

b) flow control is required
c) the fluid contains dispersed particles
d) one-way flow is required

47. The heat flux (from outside to inside) across an insulating wall with thermal conductivity k = 0.04 W / m.K and thicknes 0.16 m is 10 W / m^2. The temperature of the inside wall is -5°C. The outside wall temperature is
a) 25°C b) 30°C c) 35°C d) 40°C

48. A composite flat wall of a furnace is made of two materials A and B. The thermal conductivity of A is twice of that of material B, while the thickness of the layer A is half of that of B. If the temperature at the 2 sides of the wall are 400 K and 1200 K , then the temperature drop (in ^{0}K) across the layer of material A is
a) 125 b) 133 c) 150 d) 160

49. Heat transfer occurs by natural convection because change in temperature causes differences in
a) viscosity b) density c) thermal conductivity d) heat capacity

50. Choose the most important factor on which the heat conduction through a wall per unit time will depend on ?
a) thickness of the wall
b) area of the wall perpendicular to heat flow
c) material of the wall
d) temperature differences between the two surfaces of the wall

51. Air at 20^{0}C blows over a plate of 50 cm $\times$ 75 cm maintained at 250^{0}C. If the convection heat transfer coefficient is 25 w / m^2 ^{0}C, the heat transfer rate is
a) 215.6 kW b) 2156 kW
c) 2.156 kW d) 21.56 kW

52. The highest value of thermal conductivity is expected for
a) solid ice b) water
c) steam d) superheated steam

53. The rate of heat flow through a composite wall of three layers of thickness 0.3 m, 0.2 m, 0.15 m and of corresponding thermal conductivities 1.2, 0.8 and 0.6 kJ/hr ^{0}C is 1280 kJ/hr. If the surface area normal to the direction of flow of heat is 1m^2 and inner surface temperature is 1000^{0}C, then the interface temperature at the end of first layer will be
a) 700^{0}C b) 680^{0}C
c) 500^{0}C d) 360^{0}C

54. Free convection is solely due to
a) viscous forces b) buoyant forces
c) frictional forces d) Reynolds forces

55. Film wise condensation
    a) is characterised by a thin liquid film forming over the entire surface
    b) is less common than dropwise condensation
    c) occurs on non wettable surfaces
    d) is characterised by high heat transfer coefficients than that for drop wise condensation

56. For stripping of a gas in a counter current stripper the operating line
    a) Lies above the equilibrium curve
    b) Lies below the equilibrium curve
    c) Can lie above or below the equilibrium curve
    d) is always parallel to the equilibrium curve

57. Minimum reflux ratio in distillation column results in
    a) Optimum number of trays b) minimum recoiled size
    c) Maximum condenser size d) minimum number of trays

58. In binary distillation ,the separation of the components is easier if the relative volatility (α) is
    a) $\alpha >> 1$ b) $\alpha << 1$ c) $\alpha = 1$ d) none of these

59. In a binary distillation column ,if the feed contains 40 mol % vapor ,the q line will have a slope of
    a) 1.5 b) -0.6 c) -1.5 d) 0.6

60. The Knudsen diffusivity is dependent on
    a) The molecular velocity only
    b) The pore radius of the catalyst only
    c) The molecular mean free path only
    d) The molecular velocity and pore radius of the catalyst

61. Molecular diffusivity of liquid
    a) Increases with temperature
    b) decreases with temperature
    c) May increase or decrease with temperature
    d) is independent of temperature

62. For turbulent mass transfer in pipes ,the Sherwood number depends upon the Reynolds number (Re) as
    a) $Re^{0.33}$ b) $Re^{0.53}$ c) $Re^{0.83}$ d) Re

63. Penetration theory state that the mass transfer coefficient is equal to (where D_e is diffusivity and t is time)
    a) $(D_e t)^{1/2}$ b) $(D_e / \pi t)^{1/2}$ c) $(4D_e / \pi t)^{1/2}$ d) $(4D_e / t)^{1/2}$

64. In distillation column design ,the McCabe Thiele procedure is in adequate and a Ponchon-Savarit procedure is needed when,
    a) Saturated feed is not used
    b) an azeotrope forms
    c) The latent heats of vaporization of the more and less volatile components are greatly different
    d) A total condenser is used

65. The first law of thermodynamics takes the form $W = \Delta H$ when applied to
    a) a)A closed system undergoing a reversible adiabatic process
    b) b)An open system undergoing an adiabatic process with negligible changes in Kinetic and potential energies
    c) A closed system undergoing a reversible constant volume process
    d) d)A closed system undergoing a reversible constant pressure process

66. A Carnot cycle consists of the following steps
    a) Two isothermal and two isentropic
    b) Two isobaric and two isothermals
    c) Two isochoric and two isobaric
    d) Two isothermals and two isochoric

67. Ideal gas law is applicable at
    a) Low T, low P b) high T, high P
    c) low T, high P d) high T, low P

68. Entropy change for an irreversible process, taking into account both the system and surroundings together, is
    a) Positive b) Negative c) Zero d) None of these

69. Entropy is
    a) Intensive property b) Derived property
    c) Extensive property d) none of the above

70. Which of the following is true for Virial equation of state?
    a) Virial coefficients are universal constants
    b) Virial coefficient B represents three body interactions
    c) Virial coefficients are functions of temperature only
    d) For some gases, Virial equations and ideal gas equations are the same

71. A solid is transformed into its vapor state without passing through the liquid state at
    a) Triple point b) Boiling point c) Always d) Below triple point

72. Gibbs- Duhem equation provides a relationship between
    a) Composition in liquid phase and fugacity at constant temperature and pressure

b) Composition in liquid phase partial pressure at constant temperature and pressure
c) Composition in liquid phase and activity coefficient at constant temperature and Pressure
d) All of the above

73. The equilibrium constant *K* for a chemical reaction depends on
a) Temperature only b) pressure only
c) Temperature and pressure d) ratio of reactants

74. If $(-r_{A)} = -dC_A / dt = 0.2$ mol/(l-sec) when $C_A = 1$ mol/l. what is the rate of reaction when $C_A = 10$ mol/l?
a) 2 mol/(l-sec) b) 0.2 mol/(l-sec) c) 20 mol/(l-sec) d) 0.02 mol/(l-sec)

75. A catalyst is a substance which
a) increases the equilibrium concentration of the product
b) changes the equilibrium constant of the reaction
c) shorten the time to reach equilibrium
d) supplies the energy to the reaction.

76. The dimensionless vessel dispersion number (D/uL) for plug flow is
a) ∞ b) 0 c) 2100 d) 4000

77. For the isothermal gas-phase reaction $2A \rightarrow R$, the value of expansion factor is
a) 1 b) 0.5 c) -0.5 d) 2

78. BET apparatus is used to determine the
a) specific surface of a porous catalyst
b) pore size distribution
c) pore diameter
d) porosity of the catalyst bed

79. With the same reaction time, initial concentration and feed rate, the reaction $2A \rightarrow B$ is carried out separately in CSTR and PFR of equal volumes. The conversion will be
a) higher in PFR b) higher in CSTR
c) same in both reactors d) data insufficient

80. Semibatch reactor is preferred when
a) a highly exothermic reaction is to be controlled
b) undesirable side reaction is to be avoided
c) a gas is to be reacted with liquid
d) all a, b & c

81. A reaction is of zero order when the reaction rate is
a) directly proportional to reactant concentration
b) inversely proportional to reactant concentration

c) independent of temperature
d) none of the above

82. Promoter is added to catalyst to improve its
a) porosity
b) sensitivity
c) surface area
d) none of the above

83. The offset introduced by proportional controller with gain K_c in response of rist order system can be reduced by
a) Reducing value of K_c
b) Introducing integral control
c) Introducing derivative control
d) None of the above

84. Bode diagrams are generated from output response of the system subjected to the following input:
a) impulse b) step c) ramp d) sinusoidal

85. Thermocouples
a) Have very slow speed of response
b) Can't be connected to the measuring instrument remotely located
c) Need cold junction compensation
d) Are much less accurate compared to bimetallic or vapour pressure thermometer

86. Cascade control employs
a) Two feed forward
b) Two feedbacks
c) One feed back and one feed forward
d) None of these

87. Most commonly used controller for controlling the flow rates in industries is
a) P b) PI c) PD d) PID

88. Optical activity of a solution can be determined using a
a) Polarimeter b) Polograph
c) Dilatometer d) Refractrometer

89. Thermal wells are used in temperature measurement to
a) Guard against corrosive and oxidizing action on thermocouple materials
b) Reduce measuring lag
c) Increase the fidelity
d) Increase the sensitivity

90. Which of the following relates the absorption and evolution of heat at the junction of a thermocouple to the current flow in the circuit?

a) Seebeck effect
b) Peltier effect
c) Joule heating effect
d) Thomson effect

91. Gas analysis is commonly done using
a) Thermal conductivity cell
b) X-ray diffraction
c) Mass spectrometer
d) Emission spectrometer

92. Mass spectrometer is used for composition analysis of
a) Alloy
b) Solids
c) Isotopes
d) None of these

93. Measurement of pressure in ammonia reactor is done by
a) Bourdon gauge
b) U-tube manometer
c) Inclined tube manometer
d) Pirani gauge

94. Payback period
a) and economic life of a project are the same
b) is the length of time over which the earnings on a project equals the investment
c) is affected by the variations in earnings after the recovery of the investment
d) all *a, b* and *c*

95. In a manufacturing industry, break-even point occurs when
a) the annual rate of production equals the assigned value
b) the total annual product cost equals the total annual sales
c) the annual profit equals the expected value
d) the annual sales equals the fixed costs

96. In a chemical process plant, the total product cost comprises of manufacturing cost and the
a) general expenses
b) overhead cost
c) R and D cost
d) none of the above

97. A balance sheet for an industrial concern shows
a) the financial condition at any given time
b) only current assets

c) only fixed assets
d) only current and fixed assets

98. Which of the following is a component of working capital investment?
a) Process equipments
b) Maintenance and repair inventory
c) Utilities Plants
d) Depreciation

99. In the straight-line method for determining depreciation, it is assumed that the value of the property
a) decreases exponentially with time
b) decreases logarithmically with time
c) decreases linearly with time
d) remains constant with time

100. When is the declining balance method used?
a) The annual depreciation cost is a fixed percentage of the property value at the beginning of the particular year
b) The annual for depreciation is same each year
c) The value of the asset can decrease to zero at the end of the service life
d) The value of the asset decreases linearly with time

Bio Technology (Section Code-08)

1. Anaerobic metabolism refers to the generation of ATP:
   a) without the involvement of ADP
   b) without the use of glycogen
   c) without the use of oxygen
   d) in the absence of available oxygen

2. Embedded in the inner membrane of the mitochondrion are:
   a) the enzymes of the tricarboxylic acid cycle (Krebs' cycle)
   b) the components of the electron transport chain
   c) glycogen molecules
   d) triacylglycerol molecules

3. The important function of the fattly acids in cells is
   a) construction of cell membranes
   b) to be associated in protein synthesis
   c) in the breakdown of carbohydrates
   d) in energy reactions within the cell

4. How does an animal cell utilize the first law of thermodynamics?
   a) By utilisng the heat energy
   b) By converting the chemical bond energy in foodstuff to heat energy
   c) By creating new form of energy
   d) By destroying the existing form of energy

5. Plants and some bacteria utilize solar energy to synthesize organic molecules by
   a) photosynthesis
   b) kinetic energy
   c) potential energy
   d) chemical bond energy

6. Glycolysis is the name given to the pathway involving the conversion of:
   a) glycogen to glucose-6-phosphate
   b) glycogen or glucose to fructose
   c) glycogen or glucose to pyruvate or lactate
   d) glycogen or glucose to pyruvate or acetyl CoA

7. The structure that facilitates the entry or exit of substances is
   a) microtubule
   b) plasma membrane
   c) nucleus
   d) golgi apparatus

8. A cell has an extensive distribution of Golgi apparaus. Therefore, you expect the cell to
   a) make a lot of ATP.
   b) secrete a lot of material.
   c) move actively.
   d) perform photosynthesis.

9. Which of the following correctly matches an organelle with its function?
   a) nucleus . . . cellular respiration
   b) ribosome . . . manufacture of lipids
   c) lysosome . . . movement
   d) central vacuole . . . storage

10. Dye injected into a plant cell might be able to enter an adjacent cell through a
   a) tight junction.
   b) microtubule.
   c) desmosome.
   d) plasmodesma.

11. Innate immune system is present only in
   a) vertebrates
   b) vertebrates and invertebrates
   c) invertebrates
   d) none of the above

12. Acquired immunity is characterized by
   a) fast response
   b) involvement of toll-like receptors
   c) memory response
   d) non-specificity

13. Complement activation involves
   a) both humoral and innate immunity
   b) innate immunity alone
   c) cell-mediated immunity alone
   d) humoral immunity alone

14. Somatic hypermutation and class switching results in
   a) diversity in antibody production
   b) diversity in cytokine production
   c) diversity in complement production
   d) diversity in T-cell receptor complex

15. CD4+ T cells require the involvement of
   a) MHC III molecule
   b) MHC II molecule
   c) MHC I molecule
   d) Macrophage

16. CD8+ T cells require the involvement of
   a) Dendritic cells
   b) MHC II molecule
   c) MHC I molecule
   d) Macrophage

17. The "turnover number" of an enzyme is
    a) kcat/ km
    b) k-1
    c) kcat
    d) k1/k-1

18. Which type of inhibitor binds to both the free enzyme and the ES complex?
    a) Non competitive
    b) Uncompetitive
    c) Competitive
    d) None of the above

19. Find the velocity of an enzyme catalysed reaction, if [S] =Km
    a) 1/2 Vmax
    b) 1/3 Vmax
    c) 2/3 Vmax
    d) 1/4 Vmax

20. Which of the following statement about enzymes is TRUE?
    a) Catabolic enzymes require energy to degrade large macromolecules.
    b) Each enzyme must have a bound cofactor for a reaction to occur.
    c) Multienzyme complexes consist of many identical enzyme polypeptides .
    d) A holoenzyme consists of an inactive apoenzyme plus a cofactor.

21. α- Amylase hydrolyses
    a) glycoprotein
    b) α- 1,4 glycosidic bonds
    c) peptide bond
    d) ester bond

22. Enzyme activity is defined as
    a) the amount of enzyme needed to catalyze 1 mole of product
    b) the amount of enzyme needed to catalyze 1 micromole of product
    c) the amount of enzyme needed to catalyze 1 micromole of product in 1 minute
    d) the amount of enzyme needed to catalyze 1 mole of product in 1 minute

23. The purity of an enzyme at various stages of purification is best measured by
    a) Total protein
    b) Total enzyme activity
    c) Specific activity of the enzyme
    d) Percent recovery of protein

24. Who proposed the existence of enzyme-substrate complex?
    a) Charles Woods
    b) Adolph Hayden
    c) Charles Adolphe Wurtz
    d) Adolphe Woods

25. What will happen to reaction if activation energy is increased?
    a) Rate of reaction decrease
    b) Rate of reaction increase
    c) Reaction equilibrium shifts forward
    d) Reaction equilibrium shifts backward

26. Which would be the best chromatographic technique to separate a protein that binds strongly to its substrate?
    a) Gel filtration
    b) Affinity chromatography
    c) Cation exchange chromatogrphy
    d) Anion exchange chromatography

27. Trypsin is a
a) Exopeptidase b) Endopeotidases
c) Carboxy peptidase d) Phosphotransferase

28. The slope of the Lineweaver-Burk plot is given by
a) Km/Vmax b) 1/Vmax
c) 1/Km d) none of the above

29. Enzyme that coagulate milk?
a) Rennet b) Casein
c) Lactase d) Catalase

30. The enzyme used to dissolve blood clots
a) Streptokinase b) Glucose isomerase
c) Phosphatse d) None of the above

31. The cofactor of an enzyme is
a) Inorganic ions b) Organic molecules
c) Both a and b d) None of the above

32. A system is a key or classification based on
a) Leaf b) Flower
c) Fruit d) a particular organ

33. The evolutionary history of a taxon is called its
a) Phylogeny b) Ontogeny
c) Evolution d) Homology

34. The most promising developments in formulating a phylogeny for the entire tree of life come today from
a) Microbiology b) Molecular biology
c) Mycology d) None of the above

35. Herbaria provide the comparative material that is essential for studies in
a) Molecular Biology b) Taxonomy
c) Cell Biology d) Physiology

36. Binomal nomenclature was introduced in the year
a) 1753 b) 1707
c) 1778 d) 1725

37. Which among the following are endogenous in origin?
a) Lateral roots b) Adventitious roots
c) Leaves d) Flowers

38. Among the following which characters are not associated with the monocots?
a) Adventitious root system b) Parellel venation
c) Stelar arrangement in a ring d) Trimerous flowers

39. Open collateral endarch vascular bundles are found in
a) Dicot stem b) Monocot stem
c) Dicot root d) Monocot root

40. Secondary growth in woody dicots and many nonwoody dicots originates from their
a) Lateral meristems b) Apical meristem
c) Intercalary meristem d) Cork cambium

41. Vascular bundles in leaf are
a) Exarch b) Endarch
c) Measrch d) Polyarch

42. Recombinant DNA Technology was first proposed by
a) Peter Lobban b) James Watson
c) Dale Kaiser d) Charles Darwin

43. The commercial cultivation of transgenic crops began in
a) 1983 b) 1995
c) 2000 d) 2002

44. Plantibodies are being produced by
a) Peas b) Beans
c) Banana d) Papaya

45. The soil bacterium which induces crown gall in dicotyledonous plants is
a) Rhizobacterium b) Agrobacteriun
c) Caulobacterium d) Corynebacterium

46. The product of light reactions of photosynthesis is
a) FAD b) NADPH
c) FMN d) NAD

47. The metabolic function of fermentation is to:
a) oxidize NADH to NAD+ so that glycolysis can continue in the absense of oxygen.
b) reduce NADH so that more ATP can be produced by the electron transport chain
c) produce lactate during aerobic exercises
d) oxidize pyruvate, thus releasing more energy.

48. Which compound will produce the most ATP when oxidized
a) acetyl CoA b) glucose
c) pyruvate d) fructose biphosphate

49. Why is glycolysys considered one of the first metabolic pathways to have evolved?
a) it relies on fermentation, which is a characteristic of the archaea and bacteria
b) it is found only in prokaryotes, whereas eukaryotes use their mitochondira to produce ATP.
c) it produces much less ATP than does the electron transport chain and chemiosmosis
d) it relies totally on enzymes that are produced by free ribosomes, and bacteria have only free ribosomes and no bound ribosomes.

50. Covalent bond formation between two atoms takes place by
    a) Transfer of electron from one atom to other
    b) One side sharing of electrons
    c) Electron sharing by both interacting atom
    d) affinity between two

51. Globular protein when treated with organics solvent get denatured. The main interaction which is affected on treatment with organic solvent is
    a) H bonds
    b) Covalent bond
    c) Ionic bond
    d) Hydrophobic interaction.

52. Which of the following organism excrete uric acid?
    a) Human
    b) Fish
    c) Frog
    d) Bird

53. Which molecule has property of self replication?
    a) Protein
    b) Carbohydrate
    c) Lipids
    d) Nuclei acid

54. Among the following imino acid is
    a) Proline
    b) Arginine
    c) Tryptophan
    d) Lysine

55. Exponential growth in bacteria would be expected during
    a) lag phase
    b) log phase
    c) stationary phase
    d) deceleration phase

56. The half-life for a zero order reaction is calculated using
    a) t1/2= 0.693/k
    b) t1/2 = 2.303/k
    c) t1/2 = 1/ak
    d) t1/2 = a/2k

57. Which cells have high tensile strength?
    a) Microbial
    b) Plant cells
    c) Animal cells
    d) none of the above

58. In the bioreactor, plant cell suspensions are viscous at high concentration and behave
    a) like Newtonian fluids
    b) like Non-Newtonian fluids
    c) like Pseudoplastic
    d) None of the above

59. Increased viscosity of the culture broth
    a) decrease kLa
    b) increase kLa
    c) increase the mixing and oxygen transfer
    d) decrease the mixing and oxygen transfer

60. Bubble column reactor is used for
    a) large scale cultivation of plant cells
    b) large scale cultivation of microbial cells
    c) large scale cultivation of fungi
    d) none of the above

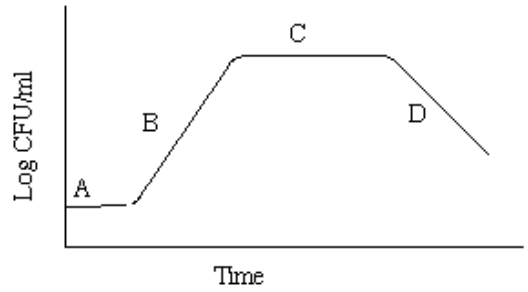
61. Airlift bioreactor is a stirred tank reactor with
a). a draught tube is inserted instead of the impeller
b) a low speed agitator is inserted
c) an impeller is inserted in the centre of the reactor
d) high speed agitator is inserted

62. Which of the following is the best definition of generation time?
a) The length of time it takes for lag phase
b) The length of time it takes for a population of cells to double
c) The maximum rate of doubling divided by the initial count.
d) The duration of log phase

63. If you start out with a population density of 200 CFU/ml of a bacterium that divides every 30 minutes, what will the population density be at the end of two hours, assuming the cells are in the log phase of growth
a) 800CFU/ml
b) 2^4CFU/ml
c) 32000CFU/ml
d) 12800CFU/ml
e) 200^4CFU/ml

64. A bacterial population increases from 100 to 100,000,000 in 15 hours. What is the generation time of this culture?
a) 45 minutes
b) 60 minutes
c) 2 hours
d) Not enough information to determine the generation time

65. Use this typical bacterial growth curve to answer the following question.



Which section shows a growth phase where the number of cells dying equals the number of cells dividing?
a) A
b) B
c) C
d) D

66. Which of the following is used to grow bacterial cultures continuously?
a) Chemostat
b) Coulter Counter
c) Hemostat
d) Petroff-Hausser chamber

67. Which of the following procedures uses a photocell to measure absorbance of a culture to regulate the flow of culture media?
a) Chemostat
b) Hemostat
c) Coulter Counter
d) Turbidostat

68. The total biomass of an organism will be determined by the nutrient present in the lowest concentration relative to the organism's requirements is a statement of
a) Liebig's Law of the minimum
b) Shelford's law of tolerance
c) the second law of thermodynamics quorum sensing
d) Heisenberg's principle of uncertainty

69. An organism is completely dependant on atmospheric O_2 for growth. This organism is A (n)
a) Osmotolerant b) Facultative anaerobe
c) Aerotolerant anaerobe d) Obligate aerobe

70. The ability of *Vibrio fischer*i to produce bioluminescence chemicals only when a certain population density has been reached is an example of
a) Liebig's Law of the minimum
b) Shelford's law of tolerance
c) the second law of thermodynamics quorum sensing
d) Quorum sensing

71. Compare the following statement and mark the answer
I. generation time of cells during the exponential phase of growth
II. generation time of cells during the lag phase of growth
a) I is greater than II
b) I is less than II
c) I is exactly or approximately equal to II
d) I may stand in more than one of the above relations to II

72. Reverse transcriptase can be used in
a) cDNA synthesis b) DNA synthesis
c) RNA synthesis d) rDNA synthesis.

73. Gene silencing can be achieved by
a) mitochondrial interference b) DNA interference
c) ribosome interference d) RNA interference.

74. Transgenic mouse means its genome contains an inserted piece of
a) DNA b) protein c) golgi complex d) carbohydrate.

75. Prokaryotic expression vector can be used to
a) express protein
b) express posttranslationally modified protein
c) express lipid
d) express phospholipids.

76. A collection of DNA clones that represent the entire genome of the organism is called
a) cDNA library b) genomic DNA library
c) mRNA library d) rRNA library.

77. S1 nuclease digests
a) double stranded DNA b) single stranded DNA
c) single stranded RNA d) cDNA.

78. Taq DNA polymerase is used in
a) RNAse protection
b) cDNA synthesis
c) DNA transfection
d) Polymerase Chain reaction.

79. mRNA can be purified using
a) oligo dA column
b) oligo dC column
c) oligo dT column
d) oligo dG column.

80. This is one of the eukaryotic promoters:
a) *lac*
b) CMV
c) *tryp*
d) *leu*

81. Poly A tail in the mRNA can provide
a) stability
b) access to RNase digestion
c) access to DNAse digestion
d) access to S1 nuclease digestion.

82. Information is stored and transmitted inside a computer in
a) binary form
b) ASCII code form
c) decimal form
d) alphanumeric form

83. The storage required for an image such as an X-ray is approximately
a) a few bytes
b) a few hundred bytes
c) a few gigabytes
d) in the megabyte range.

84. A gigabyte represents
a) 1 billion bytes
b) 1000 kilobytes
c) 230 bytes
d) 1024 bytes

85. A megabyte represents
a) 1 million bytes
b) 1000 kilobytes
c) 220 bytes
d) 1024 bytes

86. What is the origin of the prefix "nano"?
a) An Orkan expression for hello
b) Means small in Latin
c) Means dwarf in Greek
d) Coined by Plank during the development of quantum mechanics

87. Which of the following is the most bottom-up approach towards nanotechnology?
a) Photolithography
b) Self-assembly
c) Micromolding
d) Focused Ion Beam Milling

88. How many square nanometers are there in one square micrometer?
a) 10^3
b) 10^6
c) 10^9
d) 10^12

89. A quantum dot is
a) An object that changes it properties upon addition or removal of a single electron.
b) A mathematical operator used in string theory, and represented by the character "."
c) A hole in spacetime.
d) An electromagnetic vacuum fluctiation.

90. According to recent research (2011), which of the following materials appears to have the highest known thermal conductivity of any known material?
a) Carbon Nanotubes
b) Deoxyribonucleic Acid
c) Isotropically Pure Diamond
d) Single Crystaline Silicon

91. At the end of 2010, which country was putting the most money into nanotechnology research?
a) UK
b) USA
c) AUSTRALIA
d) JAPAN

92. Nanotechnology is measured in:
a) Grams
b) Nanophies
c) Nanometers
d) Millimeters

93. How many nanometers are there in a meter?
a) One Thousand
b) One Million
c) Ten Million
d) Ten Billion

94. Polio vaccine was tested on
a) Goat
b) Mice
c) Cat
d) Rat

95. GM is
a) Gene modified
b) Genetically modified
c) Gene multiplied
d) Genesis modified

96. Piece of single stranded DNA
a) RNA
b) Chromosomes
c) Genes
d) Probe

97. ELISA is based on the principle of antigen-antibody interaction
a) True
b) False
c) Partially True
d) Can't say

98. The maintenance of the body's constant internal environment is termed
a) synthesis.
b) hydrolysis.
c) replication.
d) homeostasis.

99. Find the applications of Biotechnology:
a) Transportation.
b) Therapeutics
c) Design of missiles
d) Aviation industry

100. Transgenic animals used as models for
a) Scracteches.
b) Body pain
c) Diseases
d) Headache

GIS (Section Code-09)

1. If $3x + 2y + z = 0,\ x + 4y + z = 0,\ 2x + y + 4z = 0$ be a system of equations, then
   a) It is incomsistent
   b) It has only trivial solution $x = 0, y = 0, z = 0$
   c) It can be reduced to a single equation and so a solution does not exist
   d) determinant of the matrix of coefficients is Zero

2. If 7 and 2 are two roots of the follwing equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then its third root is
   a) -9 b) 14 c) $\frac{1}{2}$ d) 2

3. The solution of $y'' = x + e^x,\ x \in R,\ y(0) = 1,\ y'(0) = 4\ is$
   a) $y = \frac{1}{2}x^2 + x + e^x$ b) $y = \frac{x^3}{3} + \frac{x^2}{2} + e^x$
   c) $y = \frac{1}{6}x^3 + 3x + e^x$ d) $y = x^3 + x^2 + x + e^x$

4. The area of the region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is
   a) 3π b) 4π c) 6π d) 36π

5. In an experiment the success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is
   a) $\frac{64}{729}$ b) $\frac{192}{729}$ c) $\frac{496}{729}$ d) $\frac{240}{729}$

6. Directional derivative of $f = xyz$ at the point (1,-1,-2) in the direction of the vector $2\bar{\imath} - 2\bar{\jmath} + \bar{k}$ is
   a) $\frac{7}{6}$ b) $\frac{7}{3}$ c) 1 d) $\frac{11}{6}$

7. If $u = x^2 + y^2 + z^2$ and $\bar{v} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ then div $(u\bar{v})$ is equal to
   a) 5*u* b) 6*u* c) 0 d) -*u*

8. The particular Integral of the differential equation $(D^3 - D)y = e^x + e^{-x}, D = \frac{d}{dx}$ is
   a) $\frac{1}{2}(e^x + e^{-x})$ b) $\frac{1}{2}x(e^x + e^{-x})$ c) $\frac{1}{2}x^2(e^x + e^{-x})$ d) $\frac{1}{2}x^2(e^x - e^{-x})$

9. If $2x - x^2 + ay^2$ is to be harmonic, then *a* should be
   a) 1 b) 2 c) 3 d) 0

10. Which of the following equation is parabolic ?
    a) $fxy - fx = 0$ b) $fxx + 2fxy + fyy = 0$ c) $fxx + 2fxy + 4fyy = 0$
    d) none

11. EMR stands for
    a) Electronic Magnetic Radiation
    b) Electrical Magnetic radiation

c) Electro Magnetic radiation
d) Electrical Magnetic resolution

12. LIS is
a) Land information system
b) Land info studies
c) Local Information studies
d) Landuse Information Section

13. Photogrammetry is
a) Making measurement using aerial photographs
b) Masking an aerial photo
c) Taking aerial photographs
d) Interpretation of aerial photographs

14. INSAT is a
a) Weather satellite
b) Communication satellite
c) Weather and communication satellite
d) Resource satellite

15. The art and science of obtaining information about an object without having any physical contact, is known as
a) Remote sneisng
b) Photogrammetry
c) Geological information system
d) GPS

16. GIS stands for
a) Geological information system
b) Geographical information system
c) Global information system
d) Global info standard

17. Sensors are
a) Device used in Remote sensing
b) Field survey instrument
c) Soil taxonomy class
d) Name of the satellite

18. Photographs without distortions are
a) Trimetrogen photographs b) Orthophotos
c) Nongeometric photographs d) Tilted photographs

19. Stereoscope is
a) An aerial photograph
b) Instrument used for 3D generation

c) Concept of 3D generation
d) Plotting device

20. BGR is
a) Visible spectrum
b) Invisible spectrum
c) Part of image
d) Non of the above

21. FCC is
a) Few colour composite
b) Fair colour composite
c) Fixed colour composite
d) False colour composite

22. GPS is
a) Ground positioning system
b) Global positioning System
c) Geometric positioning system
d) Geo positioning system

23. ---------- is a sensor
a) INSAT
b) LISS
c) IRS
d) NOAA

24. The spatial resolution of LISS III
a) 5.8m
b) 72.m
c) 23.6m
d) 1m

25. This is remote sensing system which operates in the microwave and radio wave bands of the EMR.
a) Camera.
b) Scanner.
c) Radar.
d) All the above

26. The size of the smallest object that can be discriminated by the sensor is known as
a) Spectral resolution
b) Spatial resolution
c) Radiometric resolution
d) Temporal resolution

27. Which one in the following is not a meteorological satellite?
a) NOAA
b) INSAT
c) GOES
d) QUIKBIRD

28. RADAR stands for
a) Radio Audio Development and Research
b) Regional application for Data Analysis and Research
c) Radio Detection and Ranging
d) Radiowave Determination and Resolution

29. Raster data is represented by
a) Ployline
b) Points
c) Polygons
d) Pixels

30. DIP is
    a) Digital impression and performance
    b) Digital image processing
    c) Data imaging and processing
    d) Digital image production

31. GPS satellite is
    a) IRS
    b) RESOURCESAT
    c) RADARSAT
    d) NAVSTAR

32. PCA is
    a) Primary constant analysis.
    b) Pre component analysis.
    c) Principal component analysis.
    d) Priority computation analysis .

33. Wavelength of Blue band is
    a) 0.5-0.6 Micrometer
    b) 04.-0.5 Micrometer
    c) 06.-0.7 Micrometer
    d) 08.-0.9 Micrometer

34. GCP is
    a) Ground control point
    b) Graded control point
    c) Global control point
    d) Given control point

35. Scale of a map is
    a) Map distance /Ground distance
    b) Ground distance / Map distance
    c) Ground distance/air distance
    d) Air distance/Ground distance

36. 3D to 2D conversion is called
    a) Datum
    b) Projection
    c) Scale conversion
    d) Vertical conversion

37. Parallax bar is useful for
    a) Map making
    b) Image generation
    c) Photo making
    d) Height determination

38. Water --------- IR wavelength
    a) Absorb
    b) Emit
    c) Reflect
    d) Both b and c

39. Measurement of distance by electronical instruments is
    a) Tachometer.
    b) Theodolite.
    c) EDM.
    d) Clinometer

40. Temporal resolution is
    a) Size of an object detected by sensor
    b) Revisiting capabilities of a satellite

c) Number of bands in a sensor
d) Number of grey levels of a sensor can detect

41. NDVI is a technique of
a) Digital Image Processing
b) Aerial Photographic techniques
c) Photogrammetry .
d) Total station

42. SQL meant by
a) Synthesis Query Language.
b) System Query Language.
c) Structured Query Language
d) Sectional query language.

43. GUI is
a) Geological Union Interface.
b) Geological User Interface.
c) Geographical user Interface.
d) Graphical user Interface.

44. "Student Name" is a type of
a) Measurable data
b) Raster data
c) Vector data
d) Attribute data

45. Ground control points in Photogrammetry are used for
a) Interior orientation
b) Exterior orientation
c) Absolute orientation
d) Relative orientation

46. Geology is
a) Study about the earth
b) Study about the plants on the earth
c) Subject related to soil characters
d) Branch of agriculture

47. PSLV stands for
a) Preliminary satellite Launch Vehicle
b) Polar satellite launch vehicle
c) Post satellite launch vector
d) Prime satellite launch vehicle

48. Studying the relative position between the objects on the earth surface is called
a) Remote Sensing.
b) GIS.
c) Photogrammetry.
d) Surveying.

49. Platform in remote sensing technique is
a) Vehicle carrying satellite / sensor to space
b) Satellite Launch area
c) Zone for satellite fabrication
d) a and b

50. Cubic convolution is
a) Aerial photography
b) GPS techniques
c) Type of Resampling
d) GPS observation

51. ERTS is a
a) Satellite
b) Aircraft
c) Launch vehicle
d) Photogrammetric tool

52. Satellite remote sensing can be applied to
a) Monitoring urban sprawl
b) water resources management
c) Landuse mapping
d) All above

53. Enegy equation can be written as
a) Incidence = Reflection + Absorption + Emission
b) Incidence = Reflection+ Emission
c) Incidence = Absorption + Emission
d) Incidence = Reflection + Absorption

54. In remote sensing tone is
a) Shape of an object
b) Colour of an object
c) Size of an object
d) Texture of an object

55. The following is Indian remote sensing satellite
a) IKONOS
b) LANDSAT
c) SPOT
d) CARTOSAT

56. SAR related to
a) Optical remote sensing
b) Microwave remote sensing
c) Thermal Remote sensing
d) LIDAR mapping

57. Digitisation in GIS is
a) Raster to vector conversion
b) Vector to raster conversion
c) 2D to 3D conversion
d) Automatic classification

58. DDL in database management system is
a) Data Distribution Language
b) Detailed Data Language
c) Data Definition Language
d) Detailed data definition

59. The output device in GIS is
a) Monitor
b) Printer
c) Plotter
d) b and c

60. The wave length of Microwave is
a) 1mm to 1mt
b) 1cm to 1.5mt
c) 1mm to 1 cm
d) 1nm to 1mm

61. Snow flakes are
a) Frozen rain drops
b) Moisture condensed from atmosphere
c) ice crystals resulting from water vapour
d) Ice crystals fused together

62. Tranpiration ratio is
a) Weight of water transpired / weight of dry matter produced

b) Weight of dry matter produced / Weight of water transpired
c) Evaporation / saturation
d) Saturation / Evaporation

63. Water bearing geologic formation is
a) specific yield zone b) aquitard
c) Aquifer d) Aquiclude

64. Infiltration is high in
a) Unconsolidated sediments b) Consolidated sediments
c) Igneous rocks d) Metamorphic rocks

65. SPF is
a) Sequential projected Flood b) Standard project flood
c) Sequential precipitation flood d) Standard projected forecast

66. If average annual rainfall is < 40cm is
a) Semi arid climate b) Arid climate
c) Humid climate d) Semi Humid climate

67. Colluvial soil is formed by
a) Fluvial action b) Wind action
c) Coastal action d) None of the above

68. Red soil is rich in
a) Fe b) Ca c) Mg d) Na

69. Unconsolidated Coarse grained soil is best for
a) Recharge b) Discharge
c) Infiltration d) a and c

70. Land degradation is due to
a) Soil erosion b) land subsidence
c) soil acidification d) All the above

71. Watershed / basin management is to
a) conserve the water b) conserve the soil
c) conserve the soil and water d) None of the above

72. The effluent from weather industries is
a) Chromium b) Cadmium
c) Fe d) All the above

73. CRZ stands for
a) Coastal Regulation zone b) Coastal Retreat zone
c) Crustal regulation zone d) Coastal recovered zone

74. HTL in coastal area is
a) Heavy tide line
b) High tide line
c) High Tsunami line
d) High rise tide land

75. Salt Pan is associated with
a) Fluvial land
b) Denudational Land
c) Coastal land
d) Aeolian land

76. Thermal pollution by
a) Industries
b) Vehicles
c) Agriculture activities
d) Sewerage disposal

77. Urban sprawl means
a) Urban development
b) Urban hydrology
c) Rural to urban conversion
d) Urban impact studies

78. Urban change detection can be studied by
a) Satellite Remote sensing techniques
b) Aerial photography techniques
c) LIDAR Mapping
d) All the above

79. Frequent Flooding in the urban area is due to
a) No proper drainage system
b) Less infiltration and high runoff
c) No proper Sewerage disposal
d) All the above

80. Seismology deals with
a) Earthquake
b) Flood
c) Cyclone
d) Drought

81. Land subsidence can be monitored by
a) GPS
b) Stereoscope
c) Clinometer
d) GIS

82. Coastal submergence phenomenon related to
a) sea level rise
b) Tectonic plate movement
c) Erosion
d) a and b

83. The following is not related to hydrological cycle
a) Precipitation
b) Evaporation
c) Loess
d) Transpiration

84. Hydrogeomorphology deals with
a) Water resources
b) Soil resources
c) Land resources
d) Landforms and water resources

85. Hydrograph is related to
a) Rainfall
b) Wind.

c) Earthquake d) Seismicity

86. Multispectral image means
a) Single band image
b) More than one band image
c) Nothing related to bands
d) Related to area coverage by the sensor

87. Thiessen polygon method is related to
a) Rainfall studies b) Wind velocity studies
c) Image processing techniques d) Air pollution studies

88. Overdraft of ground water in coastal region leads
a) Aquifer depletion b) Saline water intrusion
c) No change in the aquifer d) a and b

89. The TM related to
a) Sensor b) Satellite
c) Launch vehicle d) Satellite orbit position

90. Cartography is
a) Image processing b) Satellite path index
c) Art of map making d) crystal studies

91. CCD in remote sensing is
a) Computer compatible disk b) Computer cartridge disk
c) Charge couple disk d) Charged couple device

92. High resolution satellite is
a) CARTOSAT b) LANDSAT
c) EDUSAT d) NOAA

93. A micrometer equals to
a) 1×10^{-6} cm b) 1×10^{-6} m
c) 1×10^{-5} m d) 1×10^{-6} mm

94. LIDAR stands for
a) Local detection and ranging b) Live detection and ranging
c) Light detection and Ranging d) Light detection and resolution

95. Thermal remote sensing is related to
a) Temperature change monitoring b) Temporal change analysis
c) Hotsprings identification d) a and c

96. A to D in GIS means
a) Analog to data conversion b) Analog to Digital conversion
c) Analysis to data conversion d) None of the above

97. Dendritic term refers to
a) Drainage pattern b) Urban pattern
c) Soil pattern d) a and b

98. Components of GIS is
a) Computer system b) Software
c) Spatial data d) All of the above

99. Vector data is represented by
a) Point b) Pixel
c) Polygon d) (a) and (c)

100. Surface in GIS is
a) Generation of 2D b) Generation of 3D
c) Nothing to do with dimension d) Land cover studies

Environmental (Section Code – 10)

1. If $3x + 2y + z = 0,\ x + 4y + z = 0,\ 2x + y + 4z = 0$ be a system of equations, then
   a) It is incomsistent
   b) It has only trivial solution $x = 0, y = 0, z = 0$
   c) It can be reduced to a single equation and so a solution does not exist
   d) determinant of the matrix of coefficients is Zero

2. If 7 and 2 are two roots of the follwing equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then its third root is
   a) -9 b) 14 c) $\frac{1}{2}$ d) 2

3. The solution of $y'' = x + e^x,\ x \in R,\ y(0) = 1,\ y'(0) = 4\ is$
   a) $y = \frac{1}{2}x^2 + x + e^x$ b) $y = \frac{x^3}{3} + \frac{x^2}{2} + e^x$
   c) $y = \frac{1}{6}x^3 + 3x + e^x$ d) $y = x^3 + x^2 + x + e^x$

4. The area of the region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is
   a) 3π b) 4π c) 6π d) 36π

5. In an experiment the success is twice that of failure. If the experiment is repeated 6 times, the probability that atleast 4 times favourable is
   a) $\frac{64}{729}$ b) $\frac{192}{729}$ c) $\frac{496}{729}$ d) $\frac{240}{729}$

6. Directional derivative of $f = xyz$ at the point (1,-1,-2) in the direction of the vector $2\bar{\imath} - 2\bar{\jmath} + \bar{k}$ is
   a) $\frac{7}{6}$ b) $\frac{7}{3}$ c) 1 d) $\frac{11}{6}$

7. If $u = x^2 + y^2 + z^2$ and $\bar{v} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ then div $(u\bar{v})$ is equal to
   a) 5*u* b) 6*u* c) 0 d) -*u*

8. The particular Integral of the differential equation $(D^3 - D)y = e^x + e^{-x}, D = \frac{d}{dx}$ is
   a) $\frac{1}{2}(e^x + e^{-x})$ b) $\frac{1}{2}x(e^x + e^{-x})$ c) $\frac{1}{2}x^2(e^x + e^{-x})$ d) $\frac{1}{2}x^2(e^x - e^{-x})$

9. If $2x - x^2 + ay^2$ is to be harmonic, then *a* should be
   a) 1 b) 2 c) 3 d) 0

10. Which of the following equation is parabolic ?
    a) $fxy - fx = 0$ b) $fxx + 2fxy + fyy = 0$ c) $fxx + 2fxy + 4fyy = 0$
    d) none

11. Which material accounts for the greatest percentage of the weight of solid waste?
    a) Food waste b) Plastic c) Paper d) Yard waste

12. Which of the following is *not* one of the major environmental issues, resulting from human interference in the nitrogen cycle?
    a) Nitrous oxide release increases global warming
    b) Eutrophication
    c) Stratospheric ozone depletion
    d) Increased acid rain

13. Which of the following is not a major greenhouse gas?
    a) Carbon dioxide b) Methane
    c) Calcium carbonate d) Water vapour

14. Which waste comprises the largest component of our solid waste stream?
    a) Municipalities b) Agriculture
    c) Industry d) Mining

15. Which one has the lowest world wide energy consumption?
    a) Coal b) Oil c) Nuclear d) Natural gas

16. In the titration of a weak base with a strong acid, the pH after the equivalence point is controlled mostly by:
    a) hydrolysis (reaction with water) of the weak base
    b) the dissociation of water molecules
    c) the presence of excess titrant
    d) the presence of a small amount of weak acid in equilibrium with its salt

17. How much of the water on Earth is available as fresh water for drinking?
    a) 2% b) 2.5% c) 1.5% d) 1%

18. Secondary sewage treatment can best be described as being a _____ process.
    a) Physical b) Chemical c) Biological d) Geological

19. Which of the following is not true of a eutrophic lake?
    a) Low in dissolved oxygen
    b) Water is not clear
    c) Low nutrients
    d) Suffocation of fish and shellfish

20. Which of the following is a point source of water pollution?
    a) City streets in an urban area
    b) An area of farmlands
    c) Lawns and gardens in suburban areas
    d) A sewage treatment plant

21. The depth to which adequate light for photosynthesis can penetrate into water is known as what?
    a) Eutrophic Zone b) Photo Zone

c) Twilight Zone d) Euphotic Zone

22. A pathogen is a(n)
a) disease causing organism
b) disease causing virus
c) disease causing bacterium
d) Organisms that causes disease in humans

23. Biochemical oxygen demand (BOD) is an important measure of
a) oxygen content of water and wastewater.
b) the oxygen-using potential of water and wastewaters.
c) an organism's natural level of oxygen requirement.
d) a measure of the biological activity of water and wastewater

24. Most of the trash your family throws away each day ends up getting.....
a) Recycle b) Burned c) Landfilled d) Eaten

25. What is the environmentally friendly way to dispose of used tires?
a) Send them to a landfill
b) Recycle them into a playground matting
c) Dump them in a ditch along the roadway
d) Collect them and put them in a big pile

26. Water absorption through roots can be increased by:
a) Increased transpiration b) Increased rate of Photosynthesis
c) Decreased transpiration d) Decreased absorption of ions.

27. Transpiration from plants will be more rapid when
a) atmosphere is saturated with water
b) there is excess of water in soil
c) air is still
d) environmental conditions are dry.

28. Acid rain is formed due to contribution from the following pair of gases
a) Methane & Ozone b) Oxygen and nitrous oxide
c) Methane & Sulphur dioxide d) Carbon dioxide & Sulphur dioxide

29. The most serious environmental effect posed by hazardous wastes is
a) air pollution. b) contamination of groundwater.
c) increased use of land for landfills. d) destruction of habitat.

30. Which of the following is the example of Municipal and Industrial discharge pipes
a) nonpoint sources of pollution. b) violations of the Clean Water Act.
c) point sources of pollution. d) irrigation.

31. The presence of high coliform counts in water indicate
a) contamination by human wastes

b) phosphorus contamination
c) decreased biological oxygen demand
d) hydrocarbon contamination

32. Groundwater mining in coastal areas can result into
a) increase in the salinity of groundwater.
b) decrease in the toxicity of groundwater.
c) decrease in the salinity of groundwater.
d) increase in the water table.

33. The increase in the concentration of CO_2 in our environment in last fifty years (since 1960) is about
a) 24% b) 18% c) 14% d) 6%

34. Which of the following is a prime health risks associated with greater UV radiation through the atmosphere due to depletion of stratospheric ozone?
a) Damage to digestive system b) Increased liver cancer
c) Neurological disorder d) Increased skin cancer

35. What is a waste product normally excreted in the urine?
a) Excess glucose b) Excess protein
c) Red blood cells d) Urea

36. What is the maximum noise level in industries at night time?
a) 75 dB b) 70 dB c) 65 dB d) 60 dB

37. What is ambient air quality of particulate matter (less than 10µm) at annual average mean in industrial area in terms of µg / cubic metre?
a) 80 b) 70 c) 60 d) 50

38. Biotic environment includes
a) producers b) consumers c) decomposers d) all the above

39. Decomposers include
a) bacteria b) fungi c) both d) animals

40. Abiotic environment does not include
a) air b) water c) soil d) plants

41. Vermicomposting is done by
a) fungus b) bacteria c) worms d) animals

42. The group of organisms which convert light into food are called
a) autotrophs b) heterotrophs c) decomposers d) omnivores

43. Which one the following is not biodegradable?
a) vegetables b) fruits c) earthworm d) aluminium foil

44. Animal(s) which is/are active at night.
a) owl b) rat c) cockroach d) all the above

45. An animal that can tolerate the heat of the desert is
a) rats b) camel c) cow d) lion

46. Air pollution is caused by
a) Insecticides b) Sewage c) Smoke d) Loud speakers

47. If waste materials contaminate the source of drinking water which of the following diseases will spread?
a) Scurvy b) Typhoid c) Malaria d) Anaemia

48. Which of the following wastes cannot be decomposed by bacteria to form compost?
a) Kitchen wastes b) Plastic and polythene bags
c) dead plants d) bodies of insects living in the soil

49. Which of the following problems is not created by noise pollution ?
a) Diarrhoea b) Hypertension
c) Deafness d) Irritation

50. Plants are green because of the presence of a pigment called:
a) glucose b) nitrogen
c) chlorophyll d) oxygen

51. Air is composed of gases, water vapours and
a) dust particles b) rainfall
c) snowfall d) light

52. Medicine of quinine is provided by
a) Eucalyptus plant b) aconite plant
c) cinchona plant d) money plant

53. Chief source of energy in environment is
a) fire b) moon c) sun d) stars

54. When trees are cut, amount of oxygen
a) decreases b) increases c) both a) and b) d) remains same

55. Process through which plants reproduce:
a) Eating b) Evaporation c) Pollination d) Condensation

56. 71% of earth surface is covered with:
a) land b) air c) water d) coal

57. Desalination is usually done for
a) Well water b) Sea water c) River water d) Lake water

58. pH value of drinking water should be in the range of
a) 1 to 10 b) 2 to 6 c) 6.5 to 8.5 d) 8.5 to 10

59. Which of the following disease is not considered as water borne?
a) Typhoid b) Jaundice
c) Bacillary dysentry d) Malaria

60. Test for BOD are usually made at,
a) 0^{o} C – 1 Day b) 10^{o} C – 2 Days
c) 20^{o} C – 5 Days d) 20^{o} C – 3 Days

61. Smallest unit of the picture is
a) Pixel b) Circle
c) Semicircle d) Polygon

62. TIN stands for
a) Triangular Irregular Network b) Triangular Irrigational Network
c) Triangulation Survey Network d) Triangular Information Network

63. The raster data model is based on
a) Grid cells or Pixels b) Tessellations
c) Pessellations d) Projection

64. The first satellite of India
a) IRS b) Aryabhatta
c) Bhaskara d) Bhabha

65. One watt is equal to
a) 1 N/m b) 1 Nm/s
c) 1 Nm/h d) 1Nm

66. 10ppm is also expressed in
a) 10 grams per Litre b) 10 milligrams per Litre
c) 10 kilograms per Litre d) 10 grams per gallon

67. Which of the following are key application disciplines for GIS?
a) Civil Engineering b) Mechanical Engineering
c) Biology d) Physics and Chemistry

68. Water Pollution, Prevention and Control Act was enacted in India during the year
a) 1971 b) 1972 c) 1973 d) 1974

69. Permissible Fluorides limit in water as per I.S is
a) 1 ppm b) 1.5 ppm c) 2.0ppm d) 2.5ppm

70. What does 1mm on a map drawn at scale of 1 in 25000 represent in the ground?
a) 25m b) 50m c) 75m d) 100m

71. Which one of these is not a biotic component?
a) Producers b) Consumers c) Precipitators d) Decomposers

72. Which one of these is not related to sustainable development?
a) Environment b) Economy c) Society d) Leadership

73. Which of the following problem was mainly addressed in Kyoto Protocol?
a) Climatic conditions b) Water Pollution
c) Solid waste management d) Hazardous waste management

74. The cyclic exchange of nutrients between the living organisms and their non living environment is known as
a) Nitrogen Cycle b) Carbon Cycle
c) Sulphur Cycle d) Biogeochemical Cycle

75. Which one of the following is not a type of food chain?
a) Grazing b) Parasitic
c) Detritus d) Pyramid

76. Which one of these is not done in waste water treatment?
a) Primary b) Secondary
c) Tertiary d) Landfill

77. Stereo pair images are used for
a) Generating 3D-Images b) Generating Z –Co-Ordinates
c) Generating contours d) All the above

78. The IRS stands for
a) International Resources Satellite b) Indian Remote Sensing Satellite
c) Indian Regional Satellite d) None of the above

79. ISRO stands for
a) International Science Research Organisation
b) International Space Research Organisation
c) Indian Space Research Organisation
d) Indian Science Research Organisation

80. Raster data is represented by
a) Line b) Points c) Polygons d) Grids

81. Which is known as living matter or its residues, is a renewable source of energy?

a) Biomass b) Wind Energy c) Geothermal d) Ocean Energy

82. Which of these is not a adsorbent?
a) Activated Carbon b) Bauxite
c) Fuller's Earth d) Copper

83. The chemical constituents and chemical energy of some organic wastes is recovered by destructive distillation of the solid waste is,
a) Pyrolysis b) Pulverisation
c) Composting d) Incineration

84. Which of the following is not related to solid waste management?
a) Reuse b) Recycle
c) Recovery d) Resettlement

85. Which is known as the Umbrella Act?
a) Water Act b) Air Act
c) Soil Act d) Environmental Act

86. The instrument used for settleable solids is
a) Imhoff cone b) Settleable Jar
c) Jar test apparatus d) Sedimentation Tank

87. The Progressive reduction of dissolved oxygen upto ____ of the saturation value in river/stream
a) 30% b) 40%
c) 50% d) 60%

88. Which of the following is not related to Air pollution?
a) Settling chamber b) Cyclone
c) Filters d) Scrappers

89. The process by which organisms occupy a site and gradually change environmental conditions so that other species can replace the original inhabitants is called,
a) Ecological Succession b) Ecological Balance
c) Ecological Pyramid d) Ecological Growth

90. _____ is the area at the mouth of the river where river joins the sea/ocean.
a) Marine Biome b) Estuary
c) Fresh water d) Sand dune

91. The desirable limit for Total Dissolved Solids in water as per I.S is
a) 500ppm b) 800ppm
c) 1000ppm d) 1200ppm

92. What is meant by MPN?
a) Mass Processing Number
b) Most Probable Number
c) Most Processing Number
d) Mass Probable Number

93. The desirable limit is for free residual chlorine is
a) 0.02mg / L
b) 0.2mg / L
c) 2mg / L
d) 2.2mg / L

94. What is the chemical formula of Bleaching Powder?
a) $Ca(OCL)_2$
b) $Ca(OH)_2$
c) $Ca(HCO)_2$
d) $CaCl_2$

95. What is SVI?
a) Sewage Volume Index
b) Sludge Volume Index
c) Sewage Velocity Index
d) Sludge Velocity Index

96. Which of these is not a key elements in Environment Impact Assessment?
a) Scoping
b) Screening
c) Mitigating measures
d) Environment Act

97. Amendment of Environmental Impact Assessment notification in the year___.
a) 1991
b) 1992
c) 1993
d) 1994

98. The system of tradable property rights for the management of environmental quality is known,
a) Marketable Permits
b) Marketable Products
c) Marketable Rights
d) Marketable Values

99. The Basel convention is related to
a) Solid waste
b) Hazardous waste
c) Water Pollution
d) Air pollution

100. What is the Methodology adopted in EIA?
a) Bessels Method
b) Newton's Method
c) Adhoc Method
d) Hilton Method

Food (Section Code-11)

1. Resistance to change in the oxidation reduction potential is called
   a) Buffering capacity b) Water activity
   c) Poising capacity d) Biological acidity

2. Which one of the following is a bacterium?
   a) Alternaria b) Monilla
   c) Saccharomyces d) Pediococcus

3. Entrance of microorganisms into the body through the ingestion of contaminated foods is called
   a)Food infection b)Food intoxication
   c)Food contamination d)None of these

4. Time temperature combination for HTST is----------
   a)72^0C for 15 sec b)70^o C for 15 sec
   c)62^0 C for 15 sec d)75^0 C for 15 sec

5. Which is not a fermented product from milk?
   a) Cheese b) Yogurt
   c) Kefir d) Tempeh

6. Parboiling is a well developed---------- treatment given to paddy.
   a) pre-optional b) premilling
   c) postmilling d) milling

7. Cereal grains are---------- in nature.
   a)hydrophilic b)hydrophobic
   c)hydrothermal d)non thermal

8. Tempering or conditioning refers to
   a)removal of moisture b)addition of moisture
   c)drying d)none

9. Indented cylinder separator separates the material on the basis of
   a)relative size b)relative weight
   c)relative length d)relative thickness

10. Solvent extraction of soluble constituents may be termed as
    a)sublimation b)evaporation
    c)leaching d)distillation

11. Mechanism used in emery roller is
    a) impact and friction b) abrasion and friction
    c) compression and shear d) only abrasion

12. Partially fermented tea is called as
a) black tea b) oolong tea
c) bio-tea d) green tea

13. Food spoilage occurs due to
a) bacteria b)molds
c)yeasts d)all of the above

14. Queen of spices is ----------
a) Pepper b) Cardamom
c) Turmeric d) Chilli

15. Fruits are placed in a fairly gas-tight container with potassium permanganate, which absorbs
a) carbondioxide gas b)oxygen gas
c) ethylene gas d)nitrogen gas

16. _____ and _____ are milk protein and milk sugar components.
a)Actin and glucose b) Caesin and lactose
c) Plyalin and fructose d) Albumin and sucrose

17. Which test is performed to judge the efficiency of pasteurization?
a) Turbidity test b) Phosphatase test
c) COB test d) Moisture content

18. Which dairy product contains gelatin?
a) Butter b) Cheese
c) Iic-cream d) Rabri

19. Foods that contain reducing sugar undergo a color change, known as
a) maillard reaction b) enzymic browning
c) caramalization d) retrogradation

20. Vinegar is produced by
a)Orleans b) Generator method
c) Submerged fermentation method d) All of the above

21. Which was the first chemical preservative permitted in foods by the FDA?
a) Sodium benzoate b) Propionic acid
c) Parabenes d) Ethylene oxide

22. Which fatty acid is completely filled with hydrogen atom?
a) Saturated fatty acid b) Unsaturated fatty acid
c) Poly unsaturated fatty acid d) All the above

23. Linoleic acid is example for
a) essential fatty acid b) saturated fatty acid
c) unsaturated fatty acid d) poly unsaturated fatty acid

24. Activated carbon is used in oil processing for
a) degumming b) hydrogenation
c) waxing d) bleaching

25. The most abundant mineral substance in rice is
a) Calcium b) Zine
c) Potassium d) Iron

26. Gelatinization temperatures are normally within
a) 65 to 75^0 C b) 50 to 62^0 C
c) 62 to 65^0 C d)71 to 75^0 C

27. Mature corn kernel has --------- % germ
a) 9 b)12
c)15 d)11

28. Degerming is to remove
a) Hull b) Tip cap
c) Tip cap, hull and germ d) Germ

29. Egg yolk constitutes percent of the whole egg
a) 30-32% b) 35-40%
c) 45-50% d) 25-30%

30. Moisture content is more in
a) Fruit b) Vegetable
c) Nuts d) None

31. Which of the following is not the function of carbohydrates?
a) Serve as structural component
b) Energy reserves
c) Essential component in nucleic acid
d) Influence the colour of fruit and vegetable

32. Which form of sugar is used in fruit and vegetable processing?
a) Icing b) Granulated
c) Lump form d) Liquid form

33. Commercial name of nutrasweet is
a) Sunnet b) Sugar
c) Asparatame d) Glutamine

34. The relationship between RH and a_w is
a) a_w=RH / 100 b) a_w =RH / 10
c) a_w =RH d) a_w =RH / 1000

35. 1000 ppm sulphur dioxide solution contains ____g KMS in one litre of water.
a) 1.5 b) 2.5
c) 3.5 d) 4.5

36. Oxidative breakdown of complex materials present in cell into simpler molecules is called
a) Transpiration b) Ripening
c) Respiration d) None

37. Which of the following is an example for non climacteric fruit?
a)Apple b)Fig
c)Papaya d)grape

38. Conversion of glucose to pyruvate is called
a) TCA cycle b) Respiration
c) Transpiration d) EMP pathway

39. RQ for the complete oxidation of glucose is
a) 1.2 b) 1.3
c) 1.0 d) 2.

40. When tomato is held above 35^0 C, the changes are characterized as
a) Breakdown of membrane integrity
b) Disruption of cellular organization
c) Translucent appearance
d) All the above

41. The temperature at which condensation of product occurs is called
a) Dew point temperature b) Dry bulb temperature
c) Wet bulb temperature d) Atmosphere temperature

42. Fish liver oils were used for therapeutic purposes in the treatment of _____ deficiencies.
a) VitaminA and E b) VitaminA and Bcomplex
c) Vitamin Bcomplex and vitaminE d) VitaminA and D

43. Most commonly used packaging for dry fruits is
a) PP b) HDPE
c) PVC d) BOPP

44. Which one of the following is responsible for colour in the meat?
a) Sodium nitrate b) Sodium nitrite
c) Mono sodium glutamate d) None of the above

45. Removal of pin feathers in poultry is called as
a) Singeing b) Scalding
c) Defeathering d)Pitching

46. Which antimicrobial constituent is present in eggs?
a) Allicin b) Lysozyme
c) Allyl isothiocynate d) Eugenol

47. If lactometer reading shows 1.038, what is the density of milk?
a) 1038 b) 1038 kg/m^3
c) 1.038 d) 1.038 kg/m^3

48. The microorganism primarily involved in the wine fermentation is -------
a) *Saccharomyces ellipsoideus* b) *Lactobacillus lactis*
c) *Zymomonas anerobica* d) *Lactobacillus thermophilli*

49. Energy supplied by fat and oil is
a) 4 kcal / g b) 9 kcal / g
c) 14 kcal / g d) 19 kcal / g

50. The ratio between CO_2 produced and O_2 consumed is termed as
a) transpiration quotient b) respiration quotient
c) respiration rate d) transpiration rate

51. In the manufacturing of paper and paperboard ---------- of caustic soda is used in the vat containing the chipped material
a) 3% b) 5%
c) 8% d) 11%

52. Take out the odd one
a) Cellulose b) PP
c) Cardboard d) LDPE

53. For oxygen sensitive food, best packaging method is
a) MHP b) Vacuum
c) MAP d) shrink-film wrapping technique

54. Anti mortem inspection is carried out
a) After evisceration b) Before evisceration
c) Before slaughtering d) None of these

55. Candling of egg is used to define the
a) Interior quality of eggs b) Exterior quality of eggs
c) Both quality of eggs d) None of these

56. Effect of rigor mortis in the meat :
a) Reduction in pH b) Increase in pH
c) No change in pH d) All the above

57. Steam economy is higher in
a) single effect evaporator b) double effect evaporator
c) triple effect evaporator d) same in a,b and c

58. Distribution of components between a vapor phase and a liquid phase is called
a) crystallization b) distillation
c) evaporation d) mechanical separation

59. Sedimentation by forming agglomerates or clusters is called
a) flotation b) flocculation
c) gravity settling d) none of the above

60. GMP means
a) Great manufacturing practices b) Good manufacturing practices
c) Good mechanical practices d) Good manufacturing production

61. CIP means
a) Cleaning is place b) Cleaning is practice
c) Communication in practice d) Cleaning in preservation

62. Durum is the example of
a) Red wheat b) white wheat
c) Hard wheat d) soft wheat.

63. Baking powder is a combination of
a) sodium carbonate and an acid salt
b) sodium bi carbonate & water
c) sodium bi carbonate and an acid salt
d) sodium bi carbonate and an base salt.

64. Ice crystals with small radii have _____ equilibrium freezing points than crystal with larger radii.
a) slightly higher b) slightly lower
c) equal d) no relation

65. Which of the following enzyme is used for clarification of juice?
a) linear arabinase b) pectinases
c) pectin esterases d) cellulolytic enzyme

66. Inactivation of enzymes in vegetables process is known as----------
a)Blanching b) denaturation
c) enzyme inactivation d) sterilization

67. The *D*-value is affected by ….. of the product where ….. has faster *D* values on various foods.
a) pH and low pH b) pH and high pH
c) low pH and temperature d) high temperature and low pH

68. Microwave radiation is often called as
a) non-ionizing radiation b) ionizing radiation
c) electron beam d) none of the above

69. Microorganisms that prefer cold temperatures to grow is called as
a) Psychrophilic microorganisms
b) Msophilic microorganisms
c) Tthermophilic microorganisms
d) Halophillllic microorganisms

70. Haze formation in juice is mainly due to
a) pectin b) cellulose
c) hemi cellulose d) all the above

71. _____ involves cooking fruits or vegetables, sealing them in sterile cans or jars.
a) canning b) cooking
c) microwave heating d) freezing

72. Estimate the spoilage probability of a 50 minutes process at 113°C when D_{113} =4 minutes and initial microbial population is 10^4 per container
a) $3.16X\ 10^8$ b) 3.16
c) 1.02 d) 3160

73. Shade drying is recommended for
a) Herbs b)Vegetables
c) Cereals d) None

74. Which of the following is an example for sub atmosphere dehydration process?
a)Tunnel b) Belt
c) Vacuum d)Kiln

75. Cell division and subsequent cell enlargement is the major phenomenon during
a) Growth b) Maturation
c) Ripening d) Senescence present

76. Total energy released during EMP pathway is _____
a) 5ATP b) 3ATP
c) 8ATP d) 30ATP

77. Vant hoffs' equation is used to calculate
a) Q10
b) Rate of reaction in a given temperature difference
c) Respiration rate
d) Both a and b

78. Recommended RH for storage of leafy vegetable is
a) 98-100% b)65-70%
c) 80-90% d)40-50%

79. Which process is adopted in modern fruit juice packaging industry?
a)Low temperature for longer duration b)UHT
c) High temperature for shorter duration d)Direct boiling

80. Which one is not a non thermal food preservation method?
a)Ultrasonic treatment b) irrariation
c) Membrane separation d) drying

81. Egg dose not have-------
a) Shell b) Air cell c) Albumen d) Myofibrils

82. SI Unit for enthalpy is
a) J/Kg b) KJ/Kg c)cal/g d) Kcal/g

83. Large crystals are formed at
a) Slow cooling b)Fast cooling c) a and b d) None of the above

84. The fluid passing through the membrane is called
a) Retentate b) Permeate c) Distillate d)None of the above

85. Which one is not a mechanical separation?
a) Sedimentation b) Filtration
c) Crystallization d) Centrifugal separation

86. What is the condition for sedimentation in liquid?
a) Particle density is higher than liquid density
b) Particle density is lower than liquid density
c) Particle density is equal to liquid density
d) None of the above

87. Example for emulsifying agent is
a) lecithin b) albumin c) carotene d) None of the above

88. Ribbon blender is used for mixing
a) Free flowing solid b) Paste
c) Liquid d) cohesive solid

89. Which one of the following is not a metal contamination?
a) Lead b) Cadmium c) Mercury d) Stainless steel

90. Mention the joint expert committee in food additives
a) FAO & WHO b)WHO & UNESCO
b) UNO & UHP d) None of the above

91. Which pigment is the precursor for vitamin A?
a) Carotenoids b) Flavanoids c) Chlorophyll d) Xanthophylls

92. Convert amoisture content of 85% wet basis to moisture content on dry basis.
a) 567% b) 600% c) 8.5% d) 850%

93. Which one of the following is used to find out TSS?
a) Lactometer b) Refracto meter
c) Multimeter d) water activity meter

94. Which one of the following is a direct contact freezing system?
a) Plate freezer b) Air blast freezer
c) Immersion freezer d) None of the above

95. Coefficient of Performancec(COP) for Carnot refrigeration cycle is equal to
a) Q_a / W b) T_a / T_b c) $T_b / T_b - T_a$ d) W / Q_a

96. Unit for refrigeration system is
a) Ton b) Ton of refrigeration
c) Metric Ton d) Degree Celsius

97. Scouring is also refered to as
a) polishing b) husking c) whitening d) none

98. In CFTRI process, paddy is heated at
a) 80° C b) 85° C c) 90° C d) 95° C

99. Lathyrism is a disease associated with consumption of
a) Kesari dhal b) Tur dhal c) Mung dhal d)None of the above

100. Groundnut contains
a) high fat and high carbohydrate b) high protein & high carbohydrate
c) high fat & high protein d) high fat alone

Materials Science (Section code 12)

1. Find the work done by a constant force $\overline{F} = 2\hat{\imath} + 4\hat{\jmath}$, if its point of application to a block moves from A(1,1) to B(4,6)

a) 36 b) 28 c) 26 d) 32

2. If $u(x, y) = x^3 - 3xy^2 - 5y$, then its harmonic conjugate function is

a) $3x^2y - y^3 + c$ b) $3x^2y - y^3 + 5x + c$

c) $3x^2y - y^2 - 5x + c$ d) $3xy^2 - y^3 + 5x + c$

3. The particular integral of $\left(D^2 - 4D + 3\right)y = \sin 3x, \left(where\ D \equiv \frac{d}{dx}\right)$ is

a) $\frac{1}{30}(\cos 3x - \sin 3x)$ b) $\frac{1}{30}(2\cos 3x + \sin 3x)$

c) $\frac{1}{30}(2\cos 3x - \sin 3x)$ d) $\frac{1}{30}(\cos 3x - \sin 3x)$

4. The root of the equation $x^3 - 4x - 9 = 0, (using\ the\ bisection\ method\ in\ 4\ stages)$is

a) 2.6875 b) 2.3232 c) 2.7998 d) 2.1001

5. if $\overline{F} = (3x^2 - 3yz)\hat{\imath} + (3y^2 - 3zx)\hat{\jmath} + (3z^2 - 3xy)\hat{k}$, then div$\overline{F}$ is

a) 6*(x+y+z)* b) 6*(x-y-z)* c) 3*(x+y+z)* d) 2*(x+y+z)*

6. If X is a poisson variate such that P(X=1)=$\frac{3}{10}$ and P(X=2)=$\frac{1}{5}$, find λ

a) $\frac{3}{4}$ b) $\frac{3}{2}$ c) $\frac{4}{3}$ d) $\frac{1}{4}$

7. If A+B=$\begin{pmatrix}1 & -1\\ 0 & -3\end{pmatrix}$ and A-B $\begin{pmatrix}3 & 1\\ 1 & 4\end{pmatrix}$, then the product AB is

a) $\begin{pmatrix}-1 & -1\\ 0 & -3\end{pmatrix}$ b) $\begin{pmatrix}0 & -1\\ -1 & -3\end{pmatrix}$ c) $\begin{pmatrix}0 & -6\\ -2 & -2\end{pmatrix}$ d) $\begin{pmatrix}-2 & -2\\ 0 & -6\end{pmatrix}$

8. The value of $\int_0^{\frac{\pi}{2}} cos^6 x\, dx$ is

a) $\frac{3\pi}{32}$ b) $\frac{4\pi}{15}$ c) $\frac{5\pi}{32}$ d) $\frac{\pi}{32}$

9. Find the points at which the function $f(z) = \frac{z}{z^2-1}$ is not analytic.

a) $z = \pm 1$ b) $z = \pm 2$ c) $z = 1$ d) $z = -1$

10. If $x = a(\cos t + t \sin t), y = a(\sin t - t \cos t)$, find $\frac{dy}{dx}$

a) cot t b) cosec t c) sec t d) tan t

11. The total wave function of a system of identical fermions is _____ with respect to interchange of any two particle
a) antisymmetric b) symmetric
c) Hermitian c) skew symmetric

12. For a spherical symmetric probability cloud of an electron, the _____ quantum number is zero
a) principal b) orbital
c) spin d) magnetic orbital

13. The wave function of a particle in a classically forbidden region is a
a) sine function b) cosine function
c) positive exponential d) negative exponential

14. A particle is moving in a coulomb potential. An operator *A* commutes with Hamiltonian of the system. The observable corresponding to *A* is
a) position b) linear momentum
c) kinetic energy d) angular momentum

15. The possible values of total angular momentum J resulting from the addition of two angular momenta J_1=1 and J_2=2 are
a) 1,2 b) 1,3 c) 0,1,2 d) 1,2,3

16. The quantization condition for the electron wave is that
a) the value of wave function φ must not be discontinuous
b) the value of $\frac{\partial \varphi}{\partial x}$ must not be discontinuous
c) the value of φ and $\frac{\partial \varphi}{\partial x}$ must be discontinuous
d) the value of $\frac{\partial \varphi}{\partial x}$ and $\frac{\partial^2 \varphi}{\partial x^2}$ must be continuous

17. The eigen value of Hermitian operators are
a) imaginary b) indeterminate
c) real d) zero

18. If an operator commutes with a Hamiltonian, then the operator is
a) constant of motion b) dependent on time
c) partially time independent d) none of the above

19. The parity of wave function $\varphi(x)=e^{-xa^2}$ is
a) odd b) even
c) partly odd and partly even d) nil

20. The zero point energy of harmonic oscillator is a consequence of
a) uncertainty principle b) correspondence principle
c) Hamilton principle d) none of the above

21. The ratio of the volume of atoms to the total volume available in a simple cubic lattice is
a) 74% b) 66% c) 52% d) 34%

22. A dielectric material has non –uniform polarization $\vec{p}$ .The polarization volume charge density is given by
a)$|\vec{p}\,|^2$ b) $\frac{|p|}{\varepsilon}$ c) $\vec{\nabla}\cdot\vec{p}$ d) $-\vec{\nabla}\cdot\vec{p}$

23. Madelung energy is the main contribution to the binding energy of
a) ionic crystals b) covalent crystals
c) metals d) inert gas solids

24. The packing fraction of a simple cubic crystal lattice is approximately
a) 0.74 b) 0.68 c) 0.52 d) 0.32

25. The characteristic feature of the transition element is
a) a partly filled valance shell b) an empty inner shell
c) an unfilled outer shell d) a partly filled inner shell

26. The number of atoms per unit cell in the cubic diamond is
a) 4 b) 6 c) 7 d) 8

27. The conductivity of a pure semiconductor is
a) proportional to temperature
b) rises exponentially with temperature
c) decrease exponentially with increasing temperature
d) independent of temperature

28. The slope of the graph, conductivity vs reciprocal temperature, in a semiconductor is
a) $-\frac{Eg}{2K}$ b) $\frac{Eg}{2K}$ c) $\frac{Eg}{K}$ d) $\frac{KT}{Kg}$

29. A certain capacitor has a capacitance of 50 pF with air between its plates and 370 pF with a plastic between its plates. The dielectric constants of the plastic is

a) 74 b) 7.4 c) 0.012 d) 0.12

30. An element can form a strongly magnetic solid only if it its atom has
a) an incomplete valance shell b) an incomplete inner shell
c) a vacant inner shell d) a complete valence shell

31. The critical current density J_c in superconductors is a function of
a) *H* and *T* b) *H* only c) *T* only d) *E* and *T*

32. The energy of a spin wave is quantized and the unit of energy of a spin wave is called as
a) phonon b) roton c) magnon d) photon

33. The critical magnetic field *Hc* required to destroy superconductivity is a function of
a) temperature b) pressure c) volume d) electric fields

34. A superconductor exhibits
a)zero conductivity b) infinite resistivity
c) infinite conductivity d) paramagnetism

35. When a metal undergoes the superconductivity transition, thermoelectricity
a) increases b) decreases
c) remains same d) vanishes

36. A superconductor is a perfect diamagnet, with the magnetic induction *B*=0.this is
a) DC Josephson effect b) superconductor tunnelling
c) Messiner effect d) AC Josephson effect

37. The critical magnetic field for aluminium is 7.9×10^3 amp/metre the critical current which can flow through a thin long aluminium superconducting wire of diameter 10^{-3}metre is
a) 20.806 amp b) 21.806 amp
c) 24.806 amp d) 23.806 amp

38. Magnetic flux through a superconducting ring is quantized and the effective unit charge is
a) *e* b) *2e* c) *3e* d) *4e*

39. The space lattice of caesium chloride structure is
a) hcp b) bcc c) fcc d) scc

40. Superionic conductor are generally formed with

a) electrovalent bonding b) covalent bonding
c) homopolar bonding d) metallic bonding

41. According to the optical theorem at limiting distance
a) the dimension of scatterer and shadow are independent of each other
b) the dimension of the shadow is very much larger than that of the scatterer
c) the dimension of the shadow is very much smaller than that of the scatterer
d) the dimension of the shadow and scatterer are of the same order

42. The plane of polarization of a light beam travelling from one end of a Polaroid to the other end undergoes a rotation θ.It the beam is now reflected and reaches the original end along the same path, the resultant rotation is
a) 0 b) θ c) 2θ d) θ^2

43. Attenuation of intensities is observed in the rotation- vibration spectrum of
a) C_2H_2 b) HBr c) CO_2 d) N_2O

44. Which of the following is optically active ?
a) stretched polymer sheet b) calcite
c) silvered glass d) quartz

45. In the He-Ne laser the role of the He atom is
a) to emit the red light
b) to control the output
c) to control the wavelength
d) to effect population inversion between the Ne levels

46. The spectroscopic phenomenon which led to the discovery of heavy hydrogen is
a) Zeeman effect b) Stark effect
c) nuclear spin hyperfine structure d) isotope effect

47. Black hole refers to
a) holes in the heavenly bodies b) Sun spots
c) collapsing objects of low density d) collapsing objects of high density

48. The value of Bohr magneton m_B is
a) 9.27×10^{-24} J/T b) 92.7×10^{-24} J/T
c) 0.927×10^{-24} J/T d) 927×10^{24} J/T

49. Fringes in the Michelson interferometer are circular because
a) circular reflectors are used
b) they are fringes of equal inclination
c) fringes of equal thickness
d) light is emitted as spherical waves

50. A spring of force constant K is cut into three equal parts. Then the force constant of each part is
a) K b) K/3 c) 3K d) $3K^2$

51. Which of the following gates is not available as an IC?
a) Inverter b) *XOR* c) *XNOR* d) *NOR*

52. A counter which counts the sequence 1000,0100,0010,0001,1000 is called
a) Down counter b) Up-converter
c) Johonson counter d) Up-down counter

53. The minimum number of gates required to build a half adder is
a) 1 b) 2 c) 3 d) 4

54. The fastest *A* to *D* converter is
a) Simultaneous converter b) counter type converter
c) single – slope converter d) dual -slope converter

55. The ratio the highest to lower resistance value in a resistive ladder digital to analog converter converting 8 bits input is
a) 2 b) 8 c) 128 d) 256

56. The length of the instruction register in 8085 is
a) 8 bit b) 16 bit
c) 24 bit d) none of the above

57. The instruction which reset the carry flag in 8085 microprocessor is
a) STC b) CMC c) ADD A d) ANA A

58. The advantages of LCD over LED is
a) high persistence b) low power consumption
c) fast operation d) none of the above

59. The main disadvantage in using an op-amp is
a) its low gain b) its drift
c) its input impedance d) its offset voltage

60. An op-amp filter circuit uses
a) resistor and capacitors but not inductors
b) inductor and capacitor but not resistors

c) resistor, capacitor and inductors
d) only resistor but not inductor or capacitors.

61. A material is sintered by _____.
a) placing in the middle
b) finely dividing the solid
c) sieving to achieve uniform particle size
d) heating the finely divided solid to a high temperature under pressure

62. The material first shown to exhibit what we now call superconductivity was _____.
a) a thin film b) a ceramic c) a polymer d) a metal

63. Of the following, only _____ is an addition polymer.
a) polyethylene terephthalate
b) polystyrene
c) polyurethane
d) polycarbonate

64. An elastomer will fail to regain its original dimensions following a distortion beyond its _____.
a) glass transition b) phase boundary c) London force d) elastic limit

65. The monomer that is polymerized to make natural rubber is _____.
a) melamine b) formaldehyde c) ethylene d) isoprene

66. Cholesteric liquid crystals are colored because _____.
a) each molecule is a chromophore
b) of the slight twist between layers
c) of the large spacing between layers
d) of the large number of conjugated bonds

67. For a given substance that exhibits liquid-crystalline properties, the liquid-crystalline state exists _____.
a) at one particular temperature below the melting point of the solid
b) in a range of temperatures below the melting point of the solid
c) at one particular temperature above the melting point of the solid
d) in a range of temperatures above the melting point of the solid

68. Molecules with only single bonds do not generally exhibit liquid-crystalline properties because _____.

a) molecules without multiple bonds lack the rigidity necessary for alignment
b) molecules without multiple bonds are too small to exhibit liquid-crystalline

properties
c) molecules with only single bonds are gases
d) molecules with only single bonds are too big to exhibit liquid-crystalline properties

69. Who photographed nanotubes for the first time ?
a) Sumio Tijima b)Tanigchi c)Feynmann d)Drexler

70. In a bucky ball, each carbon atom is bound to _____ adjacent carbon atoms.
a)1 b)2 c)3 d)4

71. The size of red and white blood cells is in the range of _____µm.
a)2-5 b)5-7 c)7-10 d)10-15

72. A healthy diet needs a balance of many things. Which is a main source of energy?
a)fibre b)carbohydrates c)fat d)vitamins

73. What is a mutation?
a)a change in a gene or chromosome
b) a condition caused by a recessive allele
c) a process used in genetic engineering
d) a type of discontinuous variation

74. Which structure contains genes?
a)the cell membrane of an animal cell
b) the cytoplasm of an animal cell
c) the nucleus of a plant cell
d) the vacuole of a plant cell

75. Of the following biological levels of organization, which represents the smallest or lowest level?
a)organs b)populations c)cells d)organisms

76. According to the fossil record, how many times has flight evolved among vertebrates?
a)1 b)2 c)3 d)4

77. Which of the following pairs are analogous structures?
a) the front leg of a horse and a human arm
b) the front leg of a frog and a bat wing
c) the wing of a bird and a bat wing
d) the wing of a bird and a butterfly wing

78. Structures that have the same evolutionary origin even though they may now have different structures or functions are said to be
a) endemic b) analogous c)homologous d) immutable

79. The study of the way individual traits are transmitted from one generation to the next is called
a)ecology b)genetics c)cell biology d)analogy

80. Which of the following did not help Darwin formulate his theory of evolution?
a) fossil evidence that species had changed over time
b) closely related species on oceanic islands
c)belief that the earth was several thousand years old
d) evidence of artificial selection in domestic animals

81. Which of the following is a digital transducer?
a) Strain gauge b) Encoder c) Thermistor d) LVDT

82. Strain gauge, LVDT and thermocouple are examples of
a) Active transducers b) Passive transducers
c) Analog transducers d) Primary transducers

83. An inverse transducer is a device which converts
a) An electrical quantity into a non electrical quantity
b) Electrical quantity into mechanical quantity
c) Electrical energy into thermal energy
d) Electrical energy into light energy

84. A strain gauge is a passive transducer and is employed for converting
a) Mechanical displacement into a change of resistance
b) Pressure into a change of resistance
c) Force into a displacement
d) Pressure into displacement

85. Resolution of a transducer depends on
a) Material of wire b) Length of wire
c) Diameter of wire d) Excitation voltage

86. The sensitivity factor of strain gauge is normally of the order of
a) 1 to 1.5 b) 1.5 to 2.0 c) 0.5 to 1.0 d) 5 to 10

87. In wire wound strain gauges, the change in resistance is due to
a) Change in diameter of the wire b) Change in length of the wire
c) Change in both length and diameter d) Change in resistivity

88. Bonded wire strain gauges are
a) Exclusively used for construction of transducers
b) Exclusively used for stress analysis
c) Used for both stress analysis and construction of transducer
d) Pressure measurement

89. Certain type of materials generates an electrostatic charge or voltage when mechanical force is applied across them. Such materials are called
a) Piezo-electric b) Photo-electric c) Thermo-electric d) Photo-resistive

90. Quartz and Rochelle salt belongs to _____ of piezo-electric materials
a) Natural group b) Synthetic group
c) Natural or Synthetic group d) Fiber group

91. Piezo-electric transducers are
a) Passive transducers b) Inverse transducers
c) Digital transducers d) Pulse transducers

92. Piezo – electric transducers work when we apply _____ to it.
a) Mechanical force b) Vibrations c) Illuminations d) Heat

93. Piezo electric crystal can produce an emf
a) When external mechanical force is applied to it
b) When radiant energy stimulates the crystal
c) When external magnetic field is applied
d) When the junction of two such crystals are heated

94. The draw backs of strain gauges are
S1: Low fatigue life
S2: They are expensive, brittle and sensitive to temperature
S3: Poor linearity
a) S1 and S2 b) S2 and S3 c) S1 and S3 d) S1 only

95. LVDT windings are wound on
a) Steel sheets b) Aluminium c) Ferrite d) Copper

96. The size of air cored transducers in comparison to the iron core parts is
a) Smaller b) Larger c) Same d) Unpredictable

97. The principle of operation of LVDT is based on the variation of
a) Self inductance b) Mutual inductance
c) Reluctance d) Permanence

98. LVDT is an / a _____ transducer
a) Magneto-strict ion b) Inductive
c) Resistive d) Eddy current

99. Direct Wafer bonding involves permanent bonding of silicon wafers without :
a) Electric field b) Magnetic field
c) Current d) Gravity

100. Most sophisticated micromolding technique is termed as:

a) LIGA b) GIGA c) MIGA d) NIGA

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