

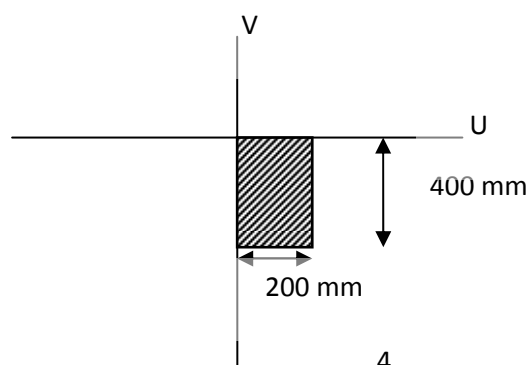
**M.Tech – Model Questions**  
**Civil (Section Code-01)**

1. Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  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  $\lambda$   
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)  $\text{cosec } t$                                       c)  $\sec t$                                       d)  $\tan t$

11. The property of a material by which it can be drawn to a smaller section due to tension is called  
 a) Plasticity                      b) ductility                      c) elasticity                      d) malleability
12. For a simply supported beam with a central load, the bending moment is  
 a) least at the centre                      b) least at the supports  
 c) maximum at supports                      d) maximum at the centre
13. Struts are load carrying members of a frame structure which are subjected to  
 a) axial tension loads                      b) axial compressive loads  
 c) torsional loads                      d) transverse loads
14. The shape of the bending moment diagram over the length of a beam, carrying udl is always  
 a) linear                      b) parabolic                      c) cubical                      d) circular
15. The value of poisson's ratio always remains  
 a) greater than one      b) less than one      c) equal to one      d) none of these
16. The maximum deflection of a simply supported beam of length L with a central load W is  
 a)  $WL^2/48EI$                       b)  $W^2L/24EI$                       c)  $WL^3/48EI$                       d)  $WL^2/8EI$
17. If the width of a simply supported beam carrying an isolated load at its centre is doubled, the deflection of the beam at the centre is changed by  
 a)  $\frac{1}{2}$                       b)  $\frac{1}{8}$                       c) 2                      d) 8
18. The window which projects outside the room of a building is known as  
 a) casement window                      b) auxiliary window  
 c) dormer window                      d) baywindow
19. In terrazzo flooring  
 a) marble chips are used as aggregates in concrete  
 b) marble chips are spread over concrete base  
 c) marble powder is mixed with concrete to give smooth surface  
 d) clay tiles on concrete base are fixed
20. In case of public buildings, the minimum width of a stairs, which is considered essential is  
 a) 100cm                      b) 125cm                      c) 150cm                      d) 175cm
21. Sand belonging to this zone is normally recommended for concretes  
 a) Zone II and III      b) Zone I                      c) Zone IV                      d) All the above
22. The lower edges of the sloping surface of a roof called  
 a) bottom ridge                      b) valley                      c) eaves                      d) gables
23. A wall constructed to withstand the pressure of earth filling is called  
 a) buttress wall                      b) parapet wall                      c) retaining wall                      d) pier
24. Which will have least weight per cubic meter?  
 a) cork                      b) glass                      c) cement                      d) saw dust

25. In case of balconies liable to overloading, the live load is taken as  
 a) 750 kg/m<sup>2</sup>                      b) 500 kg/m<sup>2</sup>                      c) 400 kg/m<sup>2</sup>                      d) 200 kg/m<sup>2</sup>
26. The inner curve of the arch is called as  
 a) Intrados                      b) Extrados                      c) Jambs                      d) rise
27. Which of the following is used for ventilation  
 a) Exhaust fans                      b) Light                      c) Air conditioners                      d) Bulb
28. Boussinesq theory is applicable if  
 a) Stress in soil is proportional to strain  
 b) Stress in soil is independent of strain  
 c) Stress in soil is inversely proportional to strain  
 d) Stress in soil is proportional to square of the strain
29. Railway Stations at which a railway line or one of its branch lines terminates are called:  
 a) Terminal Stations                      b) Junction Stations  
 c) Halt Stations                      d) central station
30. For one cubic metre of brick masonry number of bricks required is  
 a) 400                      b) 425                      c) 450                      d) 500
31. In the case of balanced section  
 a) Maximum stresses in steel and concrete simultaneously reach allowable value  
 b) steel stress reaches its maximum allowable value  
 c) concrete stress reaches its maximum allowable value  
 d) concrete stress reaches its maximum allowable value first and steel stress reaches its maximum allowable value after a time gap 't'.
32. The wall which is designed to carry super-imposed loads in addition to their own weight is known as  
 a) load bearing wall                      b) non load bearing wall  
 c) cavity wall                      d) Retaining wall
33. Footings which spread the super imposed load of wall or column over a larger area is known as  
 a) strap footing                      b) combined footing                      c) spread footing                      d) mat footing
34. When the soil mass is saturated, its bulk density is called  
 a) submerged density                      b) dry density  
 c) saturated density                      d) none of these
35. The plasticity index is the numerical difference between  
 a) liquid limit and plastic limit                      b) plastic limit and shrinkage limit  
 c) liquid limit and shrinkage limit                      d) none
36. The coefficient of uniformity is the ratio of  
 a) D<sub>10</sub> to D<sub>60</sub>                      b) D<sub>10</sub> to D<sub>30</sub>                      c) D<sub>30</sub> to D<sub>10</sub>                      d) D<sub>60</sub> to D<sub>10</sub>
37. The property of a porous material which permits the passage of water through its interconnected voids is called  
 a) permeability                      b) seepage                      c) uplift                      d) consolidation.

38. Formula for porosity is  
 a)  $n = V_v/V$                       b)  $e = V_v/V_s$                       c)  $G = \gamma_s/\gamma_w$                       d)  $\gamma_d = W_d/V$
39. When the soil mass is saturated, its bulk density is called  
 a) submerged density                      b) dry density  
 c) saturated density                      d) none of these
40. The plasticity index is the numerical difference between  
 a) liquid limit and plastic limit                      b) plastic limit and shrinkage limit  
 c) liquid limit and shrinkage limit                      d) none
41. Lacing member in a built up column is required to be designed to resist transverse shear equal to  
 a) 2.5% column load,                      b) 3.5% column load  
 c) 1.5% column load                      d) 2% column load plus additional shear due to BM.
42. Pitch of the bolt is the distance between two consecutive bolts in  
 a) the direction of stress                      b) direction perpendicular to stress  
 c) inclined direction                      d) at  $45^\circ$
43. The compressive strength of a structural member is mainly influenced by  
 a) net area                      b) slenderness ratio  
 c) yield strength                      d) failure stress.
44. If  $E_s$  and  $E_c$  are the elastic moduli of steel and concrete, then modular ratio 'm' is defined as  
 a)  $E_s/E_c$                       b)  $E_c/E_s$                       c)  $1/E_cE_s$                       d)  $E_s/2E_c$
45. The maximum percentage of chemical ingredient of cement is that of  
 a) magnesium oxide                      b) iron oxide                      c) alumina                      d) silica
46. For massive dam construction, the type of cement used is  
 a) Ordinary Portland cement                      b) rapid hardening cement  
 c) Low heat cement                      d) blast furnace slag cement
47. Los angles machine is used to test the aggregate for  
 a) Crushing strength                      b) Impact value  
 c) Abrasion resistance                      d) Water absorption
48. An ordinary Portland cement when tested for its fineness, should not leave any residue on I.S. sieve no.9, more than  
 a) 5%                      b) 10%                      c) 15%                      d) 20%
49. The product moment of inertia of the rectangular shape shown in figure with reference to axes UU and VV is

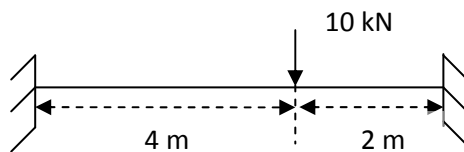




59. Shape of true stress-strain curve for a material depends on  
 a) Strain                      b) Strain rate                      c) Temperature                      d) All
60. Toughness of a material is equal to area under \_\_\_\_\_ part of the stress-strain curve.  
 a) Elastic                      b) Plastic                      c) Both                      d) None
61. Web shear cracks are likely to develop in prestressed beams with  
 a) rectangular sections                      b) Tee section  
 c) I section with thin webs                      d) none of the above
62. A line which joins subsidiary stations on the main line is known as  
 a) check line                      b) base line                      c) the line                      d) boundary line
63. A French cross staff consists of  
 a) square box                      b) hexagonal box                      c) octagonal box                      d) ground box
64. The vertical angle between the horizontal axis of a magnetic needle ( free from all other attractive forces) and the horizontal line at the point is called  
 a) bearing                      b) magnetic bearing                      c) azimuth                      d) dip
65. Critical velocity ratio, in Kennedy's regime theory, depends on:  
 a) Full supply discharge                      b) Type on canal lining  
 c) Type of silt carried by canal                      d) type of output
66. If the quadrantal bearing of a place is N  $5^{\circ} 42'$  W, the corresponding whole circle bearing would be  
 a)  $95^{\circ} 42'$                       b)  $174^{\circ} 18'$                       c)  $185^{\circ} 42'$                       d)  $354^{\circ} 18'$
67. The diameter of steel wire used for the fabrication of arrows is  
 a) 1mm                      b) 4mm                      c) 10mm                      d) 20mm
68. The length of ranging rod commonly used is  
 a) 1m                      b) 1.5m                      c) 2m                      d) 2.5m
69. The error which arise from in experience are known as  
 a) training error                      b) handing error                      c) personal error                      d) mistake
70. Which one is not the standard metric chain length  
 a) 5m                      b) 10m                      c) 20m                      d) 25m
71. Which method gives more accurate results in the measurement of area  
 a) mid ordinate rule                      b) average ordinate rule  
 c) trapezoidal rule                      d) simpson's rule
72. The leveling of instrument is done so that  
 a) vertical axis is truly vertical  
 b) line of sight is truly horizontal  
 c) optical axis is truly horizontal  
 d) effect of curvature of earth is nullified
73. Water cement ratio theoretically required for hydration of cement  
 a) 0.40                      b) 0.23                      c) 0.30                      d) 0.6

74. The compound essentially responsible for initial setting of cement is  
 a) Alite                                      b) Belite                                      c) Ferite                                      d) chlorate
75. The normal air content of concrete mix is  
 a) 1%                                      b) 2%                                      c) 4%                                      d) 5%
76. Recycling of concrete reduces the strength due to  
 a) Coarse aggregate                                      b) Porosity and water absorption  
 c) Unhydrated cement particle                                      d) Dust
77. As per IS456, the maximum strain in tension reinforcement in a section at failure shall not be less than  
 a) 0.00380                                      b) 0.0035                                      c) 0.002                                      d) 0.0042
78. In a traverse the deflection angle is the difference between  
 a) Included angle and  $90^\circ$                                       b) Included angle and  $180^\circ$   
 c) Included angle and  $270^\circ$                                       d) Included angle and  $360^\circ$
79. A long retaining wall is a case of  
 a) plane stress problem                                      b) plane strain problem  
 c) axisymmetric problem                                      d) None of the above
80. When wind load is the main load acting on a steel structure, the increase in permissible stress permitted is  
 a) 33%                                      b) 25%                                      c) 0                                      d) 10%
81. The effective length of a steel compression member fixed at one end, and partially restrained against rotation but not held in position at the other end is  
 a)  $0.5L$                                       b)  $L$                                       c)  $\frac{L}{\sqrt{2}}$                                       d)  $1.5L$
82. For designing lacing in a steel column the transverse shear to be taken into account is  
 a) actual shear coming to the column                                      b) 50% of axial load  
 c) 2.5% of axial load                                      d) 25% of axial load
83. Bolts subjected to both shear and axial tension shall satisfy one of the following interaction equations,  $\tau_{uf}$  is shear stress and  $\sigma_{tf}$  is tensile stress  
 a)  $\frac{\tau_{uf}, C_{al}}{\tau_{uf}} + \frac{\sigma_{tf}, C_{al}}{\sigma_{tf}} \leq 1.4$                                       b)  $\frac{\tau_{uf}, C_{al}}{\tau_{uf}} + \frac{\sigma_{tf}, C_{al}}{\sigma_{tf}} \leq 1$   
 c)  $\frac{\tau_{uf}, C_{al}}{\tau_{uf}} + \frac{\sigma_{tf}, C_{al}}{\sigma_{tf}} \leq 1.2$                                       d)  $\frac{\tau_{uf}, C_{al}}{\tau_{uf}} + \frac{\sigma_{tf}, C_{al}}{\sigma_{tf}} \leq 1.5$

84. The reactions at the left support of the beam shown are



- a) 8.89 kNm, 6.67 kN                                      b) 4.44 kNm, 3.33 kN  
 c) 8.89 kNm, 7.41 kN                                      d) 4.44 kNm, 2.59 kN





95. For  $q = 5 \text{ m}^3/\text{sec} / \text{m}$  and  $f = 0.9$ , the scour depth  $R$  (m) is equal to:  
a) 7.89                      b) 6.49                      c) 4.09                      d) 3.02
96. Turbidity is measured on  
a) standard silica scale                      b) standard cobalt scale  
c) standard platinum scale                      d) platinum cobalt scale
97. The most common cause of acidity in water is  
a) carbon dioxide      b) oxygen                      c) hydrogen                      d) nitrogen
98. Abiotic environment does not include  
a) air                      b) water                      c) soil                      d) plants
99. 71% of earth surface is covered with  
a) air                      b) water                      c) land                      d) coal
100. 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

**Mechanical (Section Code-02)**

1. Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  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  $\lambda$ 
  - 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)  $\text{cosec } t$
  - c)  $\sec t$
  - d)  $\tan t$

11. A force which combines with two or more forces to produce equilibrium is called  
 a) resultant                      b) equilibrium              c) couple                      d) moment
12. The angle between two forces when resultant is maximum and minimum respectively is  
 a)  $0^\circ$  and  $180^\circ$               b)  $180^\circ$  and  $0^\circ$               c)  $90^\circ$  and  $180^\circ$               d)  $90^\circ$  and  $0^\circ$
13. A train crosses a tunnel in 30 seconds time. The speed of the train at entry to and exit from the tunnel are 36 and 54 km/hr respectively. If acceleration remains constant, the length of the tunnel is  
 a) 350 m                      b) 360 m                      c) 375 m                      d) 400 m
14. The moment of inertia of a square of side a) about an axis through its centre of gravity is  
 a)  $a^4/4$                       b)  $a^4/8$                       c)  $a^4/12$                       d)  $a^4/36$
15. The friction experienced by a body, when in motion, is known as  
 a) rolling friction                      b) dynamic friction  
 c) limiting friction                      d) static friction
16. The metal suitable for bearings subjected to heavy loads is  
 a) silicon bronze                      b) white metal  
 c) monel metal                      d) phosphor bronze
17. When a load W is applied suddenly on a bar of cross-sectional area A, the stress induced in the bar will be  
 a)  $\frac{W}{A}$                       b)  $\frac{W}{2A}$                       c)  $\frac{2W}{A}$                       d)  $\frac{3W}{A}$
18. When a circular beam of diameter d is subjected to a shear force F, the maximum shear stress induced will be  
 a)  $\frac{4F}{\pi d^2}$                       b)  $\frac{6F}{\pi d^2}$                       c)  $\frac{8F}{\pi d^2}$                       d)  $\frac{16F}{3\pi d^2}$
19. The design of the pressure vessel is based on  
 a) longitudinal stress                      b) hoop stress  
 c) longitudinal and hoop stress                      d) shear stress
20. The permissible stress in the fillet weld is  $100 \text{ N/mm}^2$ . The fillet weld has equal leg lengths of 15 mm each. The allowable shearing load on the weldment per cm length of the weld is  
 a) 7.5 KN                      b) 10.6 KN                      c) 15 KN                      d) 22.5 KN
21. The relation between Young's modulus (E), shear modulus c) and bulk modulus (K) is given by  
 a)  $E = \frac{3K.C}{3K+C}$                       b)  $E = \frac{6K.C}{3K+C}$                       c)  $E = \frac{9K.C}{3K+C}$                       d)  $E = \frac{12K.C}{3K+C}$

22. 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
23. A thin cylinder of internal diameter 1.2 m contains fluid at a pressure of 20 kg<sub>f</sub>/cm<sup>2</sup>. If the longitudinal and circumferential stresses are not to exceed 350 and 450 kg<sub>f</sub>/cm<sup>2</sup>, the thickness of cylinder should be nearest to  
 a) 1.3 cm                      b) 1.7 cm                      c) 3.4 cm                      d) 2.6 cm
24. The polar moment of inertia of a solid circular shaft of diameter d) is  
 a)  $\frac{\pi D^3}{16}$                       b)  $\frac{\pi D^3}{32}$                       c)  $\frac{\pi D^4}{32}$                       d)  $\frac{\pi D^4}{64}$
25. The Rankine's formula holds well for  
 a) short columns                      b) long columns  
 c) both short and long columns                      d) weak columns
26. Henry ford is noted for his contributions to  
 a) standardization of parts                      b) statistical quality control  
 c) assembly line operations                      d) time and motion studies
27. Which of the following is not an element of the management process?  
 a) pricing                      b) staffing                      c) planning                      d) controlling
28. Productivity measurement is complicated by  
 a) the competition's output  
 b) the fact that precise units of measure are often unavailable  
 c) stable quality  
 d) the workforce size
29. The delphi method is best suited for  
 a) decision-making                      b) cost control  
 c) overhead rate estimating                      d) team discussions
30. Which of the following is not an example of a type of schedule report?  
 a) Gantt chart                      b) milestone chart  
 c) Fishbone diagram                      d) network diagram
31. The Poisson's ratio for cast iron varies from  
 a) 0.23 to 0.27                      b) 0.25 to 0.33                      c) 0.31 to 0.34                      d) 0.32 to 0.42
32. Which of the following cotter joint will be used to connect strap end of a connecting rod?  
 a) spigot and socket cotter joint                      b) sleeve and cotter joint  
 c) gib and cotter joint                      d) V-joint
33. What are the two ways that a company can obtain new products?

- a) new-product development and acquisition
  - b) service development and product extension
  - c) internal development and merger
  - d) line extension and brand management
34. A machine having an efficiency less than 50%, is known as
- a) reversible machine
  - b) non-reversible machine
  - c) neither reversible nor non-reversible machine
  - d) ideal machine
35. A model which considers uncertainty as an important aspect of the problem is
- a) descriptive modal
  - b) stochastic model
  - c) deterministic model
  - d) dynamic model
36. The penalty costs that are incurred as a result of running out of stock are known as
- a) shortage cost
  - b) set-up cost
  - c) handling cost
  - d) capital cost
37. A customer may leave the queue, if there is no waiting space is called as
- a) reneging
  - b) balking
  - c) jockeying
  - d) priorities
38. Jigs are used
- a) for holding and guiding the tool in drilling, reaming operations
  - b) for holding the work in milling, grinding, planning operations
  - c) to check the accuracy of work piece
  - d) to assemble the finished work pieces
39. The floating position of the holding fixture in a rotary transfer device is used to
- a) improve the accuracy of location
  - b) reduce the tendency to over-index
  - c) improve upon the acceleration and deceleration characteristics
  - d) reduce the cycle time
40. The diamond locating pin is used in jigs and fixtures because
- a) diamond is very hard and wear resistant
  - b) it occupies very little space
  - c) it helps in assembly with tolerance on centre distance
  - d) it has a long life
41. Super conduction by metals is observed in the temperature range of
- a) below  $10^0$  K
  - b) above  $100^0$  K
  - c) around  $0^0$  C
  - d) around  $100^0$  C
42. Annealing of white cast iron results in production of
- a) malleable iron
  - b) nodular iron
  - c) spheroidal iron
  - d) grey iron

43. Inconel is an alloy of  
 a) nickel, chromium  
 b) nickel, copper  
 c) nickel, chromium and iron  
 d) nickel, zinc
44. Connecting rod is usually made of  
 a) cast iron  
 b) medium carbon steel  
 c) low carbon steel  
 d) high carbon steel
45. Steel made from phosphatic iron is  
 a) hard  
 b) brittle  
 c) ductile  
 d) tough
46. solder is an alloy of  
 a) tin, antimony, and copper  
 b) tin and copper  
 c) tin and lead  
 d) lead and zinc
47. Cemented carbide tools are not found to be suitable for cutting  
 a) brass  
 b) cast iron  
 c) steel  
 d) aluminium
48. Diamond has  
 a) low heat conductivity  
 b) high electrical conductivity  
 c) lowest thermal expansion  
 d) high coefficient of friction
49. Which of the following moulding methods is generally not used for thermoplastic materials  
 a) extrusion  
 b) injection  
 c) casting  
 d) calendaring
50. The percentage of chromium in HSS tool steel is  
 a) 4%                      b) 18%                      c) 1%                      d) 0.1%
51. Fluxes are used in welding in order to protect the molten metal and the surfaces to be jointed from  
 a) oxidation  
 b) carburizing  
 c) dirt  
 d) distortion and warping
52. Preheating is essential in welding  
 a) HSS  
 b) stainless steel  
 c) cast iron  
 d) aluminium
53. Neutral flame has  
 a) 1 zone  
 b) 2 zones  
 c) 3 zones  
 d) 4 zones
54. Facing sand used in foundry work comprises of  
 a) alumina, silica, and clay  
 b) silica, and clay  
 c) alumina, and clay  
 d) alumina, and silica

55. Fettling is an operation performed  
 a) before casting  
 b) during casting  
 c) after casting  
 d) after heat treatment
56. The increase in hardness due to cold working is called  
 a) work hardening  
 b) hot hardening  
 c) cold hardening  
 d) age-hardening
57. Which of the following is a gear finishing operation?  
 a) hobbing  
 b) shaping  
 c) milling  
 d) shaving
58. Average cutting speed in machining mild steel by single point cutting tool of H.S.S is  
 a) 10 m/min  
 b) 20 m/min  
 c) 30 m/min  
 d) 40 m/min
59. In a shaper machine, the mechanism for tool feed is  
 a) Geneva mechanism  
 b) whitworth mechanism  
 c) ward-leonard system  
 d) ratchet and pawl mechanism
60. A side and face cutter 125mm diameter has 10 teeth. It operates at a cutting speed of 14 m/min with a table traverse 100 mm/min. The feed per tooth of the cutter is  
 a) 10 mm  
 b) 2.86 mm  
 c) 0.286 mm  
 d) 28.6 mm
61. The ease with which observation can be made accurately is referred to as  
 a) repeatability  
 b) readability  
 c) sensitivity  
 d) precision
62. Optical flats are made of  
 a) quartz  
 b) plastic  
 c) glass  
 d) silicon
63. Plug gauges are used to  
 a) measure the diameter of work piece  
 b) measure the diameter of holes in work piece  
 c) check the diameter of the holes in work piece  
 d) check the outside diameter of work piece
64. Best wire size in effect diameter measurement is  
 a)  $p/2 \sec x$   
 b)  $p \sec x/2$   
 c)  $p \cos x/2$   
 d)  $p/2 \cos x/2$
65. The normal chordal tooth thickness of a gear is shortest distance from the  
 a) tooth crest to the point of chord  
 b) tooth crest to mid point of the chord  
 c) mid point of the const chord to the tip of the tooth  
 d) from the tooth crest to any point on the chord





76. An electric cable made up of aluminium conductor ( $k = 240 \text{ W/mK}$ ) is to be insulated with rubber ( $k=0.15 \text{ W/mK}$ ) and surrounded by air ( $h = 6 \text{ W/m}^2\text{K}$ ). The critical insulation of thickness will be  
 a) 800 mm                      b) 160 mm                      c) 40 mm                      d) 25 mm
77. The COP of heat pump and that of refrigerator has the relation of  
 a)  $\text{COP}_{\text{HP}} = \text{COP}_{\text{R}} + 1$                       b)  $\text{COP}_{\text{R}} = \text{COP}_{\text{HP}} + 1$   
 c)  $\text{COP}_{\text{HP}} / \text{COP}_{\text{R}} = 1$                       d)  $\text{COP}_{\text{HP}} / \text{COP}_{\text{R}} < 1$
78. During sensible cooling  
 a) Relative humidity remains constant  
 b) Partial pressure remains constant  
 c) Wet bulb temperature remains constant  
 d) Dry bulb temperature remains constant
79. The centrifugal pump gives maximum efficiency when its blades are  
 a) forward curved                      b) backward curved  
 c) straight                      d) wave shaped
80. The latent heat load in an auditorium is 25% of the sensible heat load. The value of SHF is equal to  
 a) 0.25                      b) 0.50                      c) 0.80                      d) 1.0
81. In a 6x6 transportation problem, degeneracy would arise, if the number of filled slots were  
 a) equal to 36                      b) more than 12  
 c) less than 11                      d) equal to 12
82. For infinite parallel planes with emissivity of 0.8 each, the interchange factor for radiation from one surface another is  
 a) 0.46                      b) 0.56  
 c) 0.76                      d) 0.66
83. The acoustic velocity of isentropic flow of air having specific heat ratio 1.4 and difference in specific heat  $0.287 \text{ kJ/kg-K}$  at a temperature  $400 \text{ }^\circ\text{C}$  is  
 a) 401 m/s                      b) 520 m/s  
 c) 12.7 m/s                      d) 16.4 m/s
84. In a condenser of a power plant, steam condenses at  $60^\circ\text{C}$ . The cooling water enters at  $30^\circ\text{C}$  and leaves at  $45^\circ\text{C}$ . The LMTD of the condenser is  
 a)  $12.6^\circ\text{C}$                       b)  $21.6^\circ\text{C}$                       c)  $16.2^\circ\text{C}$                       d)  $26.2^\circ\text{C}$
85. Which one of the following step would lead to interchangeability?  
 a) quality control                      b) product design  
 c) operator training                      d) process planning
86. The value of enthalpy of steam at inlet and outlet of a Rankine cycle are 2800 kJ/kg and 1800 kJ/kg respectively. Neglecting pump work, the specific steam consumption in kg/kW-hr is  
 a) 1.0                      b) 0.36                      c) 0.28                      d) 3.6



96. Two alternative methods can produce a product, first method has a fixed cost of Rs.2000/- and variable cost Rs.20/per piece. The second method has fixed cost of Rs.1500/- and a variable cost of Rs.30/-. The break even quantity between the two alternatives is  
a) 25                      b) 50                      c) 75                      d) 100
97. The calorific value determined by the bomb calorimeter is  
a) lower calorific value at constant pressure  
b) lower calorific value at constant volume  
c) higher calorific value at constant pressure  
d) higher calorific value at constant volume
98. In milk chilling plants, the usual secondary refrigerant is  
a) brine                      b) ammonia                      c) glycol                      d) silicate
99. The work done by an engine is 15 kJ per cycle and the piston displacement of the engine is 0.02 m<sup>3</sup>, the mean effective pressure is  
a) 6.5 bar                      b) 7.5 bar                      c) 8.5 bar                      d) 9.5 bar
100. At 100% relative humidity, the wet bulb temperature is  
a) more than dry bulb temperature                      b) less than dew point temperature  
c) equal to ambient temperature                      d) same as dew point

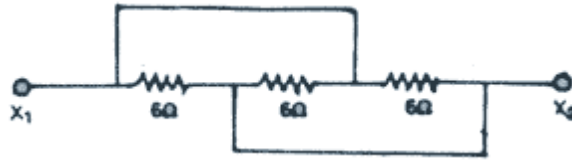
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### Electrical (Section Code-03)

- Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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
- 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)  $3xy^2 - y^3 + 5x + c$
- The particular integral of  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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)  $\frac{1}{30}(\cos 3x - \sin 3x)$
- 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
- if  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  is  
a)  $6(x+y+z)$                                       b)  $6(x-y-z)$                                       c)  $3(x+y+z)$                                       d)  $2(x+y+z)$
- If X is a poisson variate such that  $P(X=1) = \frac{3}{10}$  and  $P(X=2) = \frac{1}{5}$ , find  $\lambda$   
a)  $\frac{3}{4}$                                       b)  $\frac{3}{2}$                                       c)  $\frac{4}{3}$                                       d)  $\frac{1}{4}$
- 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)  $\begin{pmatrix} -2 & -2 \\ 0 & -6 \end{pmatrix}$
- 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)  $\frac{\pi}{32}$
- 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)  $z = -1$
- If  $x = a(\cos t + t \sin t)$ ,  $y = a(\sin t - t \cos t)$ , find  $\frac{dy}{dx}$   
a)  $\cot t$                                       b)  $\text{cosec } t$                                       c)  $\sec t$                                       d)  $\tan t$

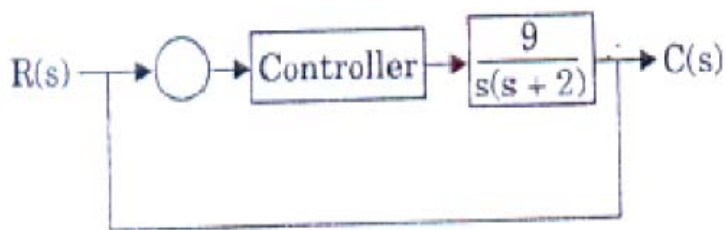


20. Three resistance of 6 ohm each are connected as shown in Figure given below. The equivalent resistance between  $X_1$  and  $X_2$  is



- a) 2 ohm                      b) 4 ohm                      c) 8 ohm                      d) 12 ohm
21. The transfer function of a linear control system given by  
 $G(S) = \frac{100(S+15)}{S(1+4S)(S+10)}$   
 In its Bode diagram, the value of gain for  $\omega = 0.1 \text{ rad/sec}$  is
- a) 20 db                      b) 40 db                      c) 60 db                      d) 80 db
22. The breakaway point in the root loci plot for the loop transfer function  
 $G(S)H(S) = \frac{K}{S(S+3)^2}$  is
- a) - 2.5                      b) - 2.0                      c) -1.0                      d) -0.5
23. The spherical density of pink noise varies
- a)  $\frac{1}{f}$                       b)  $\frac{1}{f^2}$                       c)  $f$                       d)  $f^2$
24. For a type one system, the steady - state error due to step input is equal to
- a) infinite                      b) zero.                      c) 0.25.                      d) 0.5.
25. The input to a controller is
- a) sensed signal                      b) desired variable value  
 c) error signal                      d) servo-signal
26. Electrical time-constant of an armature-controlled dc servomotor is
- a) equal to mechanical time-constant.  
 b) smaller than mechanical time-constant.  
 c) larger than mechanical time-constant.  
 d) not related to mechanical time-constant.
27. Polar plot of  $G(j\omega) = \frac{1}{j\omega(1+j\omega)}$
- a) Crosses the negative real axis.                      b) Crosses the negative imaginary axis.  
 c) Crosses the positive imaginary axis.                      d) None of the above.
28. The open-loop transfer function of a unity feedback system is  
 $G(s) = \frac{K}{s^2(s+5)}$ ;  $K > 0$  The system is unstable for
- a)  $K > 5$                       b)  $K < 5$                       c)  $K > 0$                       d) all the above.

29.



In the control system shown above the controller which can give zero steady- state error to a ramp input is of

- a) proportional type  
 b) Integral type  
 c) Derivative type  
 d) Proportional plus derivative type
30. A self excited d.c shunt generator, driven by its prime mover at the rated speed fails to build up the voltage across its terminals at no load. What reason can be assigned for this?
- a) The initial shunt field mm does not assist the residual magnetism  
 b) The field circuit resistance is higher than the critical resistance  
 c) One of the inter-pole connections is removed  
 d) Brush axis slightly shift from the geometrical neutral axis of the machine
31. Armature torque of a d.c motor is a function of which of the following factors
1. Speed
  2. Field Flux
  3. Armature Current
  4. Residual Magnetism
- Select the correct answer
- a) 2 and 3                      b) 1 and 4                      c) 3 and 4                      d) 1 and 2
32. The induced voltage in a single loop reverses:
- a) Once in each revolution                      b) Once in each half revolution  
 c) Once in each one quarter revolution                      d) Once in each two revolutions
33. If the supply voltage of the induction motor is reduced by 10%. By what percentage approximately will the maximum torque decreases?
- a) 5%                      b) 10%                      c) 20%                      d) 40%
34. The speed of the rotor field in an induction motor (with running speed  $N$  and synchronous speed  $N_s$ ) with relative to the stator field is
- a)  $N_s$                       b)  $N$                       c)  $sN$                       d) none of these
35. A single phase Induction motor is running at  $N$  rpm. Its synchronous speed is  $N_s$ . If its slip with respect to forward field is 's', what is the slip with respect to the backward field is:
- a)  $s$                       b)  $-s$                       c)  $(1-s)$                       d)  $(2-s)$
36. Which type of emf is induced in the dc generator ?
- a) Dynamically                      b) Static                      c) Electrostatic                      d) Magentic





47. A 440 V, e-phase, 10 pole and 50 Hz synchronous motor delivering a torque of p 50 Nm, delivers a power of:
- a) 50 W                      b) 500 W                      c) 1000 W                      d) 2000 W
48. The emf induced in a conductor of machine driven at 600 rpm, the peak value of flux density is 1.0 Wb/m<sup>2</sup>, diameter of machine 2.0 meter and length of machine 0.30 m is:
- a) 41. 83 V                      b) 29.58 V                      c) 9.42 V                      d) 18.84 V
49. Which three-phase connection can be used in a transformer to introduce a phase difference of 300 between its output and corresponding input line voltages?
- a) Star-star                      b) Star-delta                      c) Delta-delta                      d) Delta-Zigzag
50. When one transformer is removed from a D-D bank of 30 kVA transformer, the capacity of the resulting 3-phase transformer in V-V connection will be:
- a) 11.5 kVA                      b) 17.3 kVA                      c) 20 kVA                      d) 25.9 kVA
51. A two-winding 220 V/110 V, 1.5 kVA transformer is reconnected as a 220/330 auto-transformer. It is re-rated as:
- a) 3.88 kVA                      b) 4.488 kVA                      c) 1.58 kVA                      d) 2.258 kVA
52. The full-load copper-loss and iron-loss of a transformer are 6400 W and 500 W respectively. The above copper loss and iron loss at half load will be:
- a) 3200 W and 250 W respectively                      b) 3200 W and 500 W respectively  
c) 1600 W and 125 W respectively                      d) 1600 W and 500 W respectively
53. What is the waveform of the current flowing through the diode in a buck-boost converter?
- a) Square wave                      b) Triangular Wave  
c) Trapezoidal wave                      d) Sinusoidal wave
54. The use of multiphase rectifier in place of 1-phase rectifier results in:
- a) Increased output voltage and reduced harmonics  
b) Increased output voltage and increased harmonics  
c) Decreased output voltage and reduced harmonics  
d) Increased output voltage and no effect on harmonics
55. An advantage of a cycloconverter is:
- a) Very good power factor  
b) Requires few number of thyristors  
c) Commutation failure does not short circuit the source  
d) Load commutation is possible
56. For low-speed high-power reversible operation, the most suitable drives are:

- a) voltage source inverter bed ac drives
  - b) Current source inverter bed ac drives
  - c) Dual converter bed dc drives
  - d) Cycloconverter bed ac drives
57. Consider the following statements:
1. A thyristor requires turn off circuit while transistor does not
  2. The voltage drop of a thyristor is less than that of a transistor.
  3. A thyristor requires a continuous gate current.
  4. A transistor draws continuous base current
- Which of these statements are correct?
- a) 1, 2, 3 and 4            b) 1 and 2            c) 2 and 4            d) 1 and 4
58. Which one of the following statements is NOT correct for a MOSFET?
- a) Are easy to parallel for higher current
  - b) Leakage current is relatively high
  - c) Have more linear characteristic
  - d) Overload and peak current handling capability are high
59. A thyristor can be switched from a non-conducting state to a conducting state by applying:
1. Voltage more than forward break over voltage
  2. A voltage with high  $dt / dv$
  3. Positive gate current with +ve anode voltage
  4. Negative gate current with positive anode voltage
- a) 1, 2, 3 and 4 are correct            b) 1, 2 and 4 are correct  
c) 1, 2 and 3 are correct            d) 2, 3 and 4 are correct
60. An SCR is in conducting state, a reverse voltage is applied between anode and cathode, but it fails to turn off. What could be the reason?
- a) Positive voltage is applied to the gage.
  - b) The reverse voltage is small
  - c) The anode current is more than the holding current
  - d) Turn off time of SCR is large
61. A long specimen of p-type semiconductor material
- a) is positively charged
  - b) is electrically neutral
  - c) has an electric field directed along its length
  - d) acts as dipole
62. As the temperature is increased, the voltage across a diode carrying a diode a constant current.
- a) Increases
  - b) Decreases
  - c) Remains constant
  - d) May increase or decrease depending upon the doping levels in the junction.

63. Two p-n junction diodes are connected back to back to make a transistor. Which one of the following is correct?
- The current gain of such a transistor will be high
  - The current gain of such a transistor will be moderate
  - It cannot be used as a transistor due to large base width
  - It can be used only for pnp transistor.
64. A Triangular-square wave generator uses
- A sine wave oscillation and comparator
  - An integrator and a comparator
  - A differentiator and a comparator
  - A sine wave oscillator and a clipper
65. In BJT amplifier with the introduction of feedback, the input impedance is reduced, output impedance is increased, bandwidth is increased and distortion is reduced. The feed back is
- Voltage series
  - Current series
  - Voltage shunt
  - Current shunt
66. In an RC coupled amplifier, the gain decreases in the frequency response due to the
- Coupling capacitor at low frequency and bypass capacitor at high frequency
  - Coupling capacitor at high frequency and bypass capacitor at low frequency
  - Coupling junction capacitance at low frequency and coupling capacitor at high frequency.
  - Device junction capacitor at high frequency and coupling capacitor at low frequency.
67. The open -loop voltage gain of an amplifier is 240. The noise level in the output without feedback is 100mV. If a negative feedback with  $\beta = 1/60$  is used, the noise level in the output will be
- 1.66 mV
  - 2.4 mV
  - 4.0 mV
  - 20 mV
68. The threshold voltage of an N-channel MOSFET can be increased by
- Increasing the channel dopant concentration
  - Reducing the channel dopant concentration
  - Reducing the gate-oxide thickness
  - Reducing the channel gain
69. The conduction loss versus device current characteristic of a power MOSFET is best approximated by
- a parabola
  - a straight line
  - a rectangular hyperbola
  - an exponentially decaying function
70. In a negative feedback amplifier, when is the input impedance increased?
- If the signal sampled is a voltage
  - If the signal sampled is a current
  - If the feedback signal is a voltage
  - If the feedback signal is a current.
71. A depletion type NMOS is operated in enhancement mode.  $V_p = -4$  volts. For  $V_{GS} = +3V$  as  $V_{DS}$  is increased,  $I_D$  becomes nearly constant when  $V_{DS}$  equals
- 1 volts
  - 3 volts
  - 4 volts
  - 7 volts

72. 80A 7411 is a  
 a) op-amp, monolithic and short circuit protection in built  
 b) 2 input NAND gate  
 c) 3 input NAND gate with open collector output  
 d) none of these
73. The astable multivibrator has  
 a) two stable states  
 b) one stable, one quasi stable  
 c) two quasi-stable states  
 d) none of these
74. Which of the following circuit exhibits memory?  
 a) astable multivibrator  
 b) bistable multivibrator  
 c) NAND gate  
 d) EX-OR gate
75. A circuit in which the output voltage waveform is the integral of the input voltage waveform  
 a) integrator  
 b) differentiator  
 c) logarithmic amplifier  
 d) comparator
76. The following is a general purpose regulator  
 a) IC723  
 b) IC741  
 c) LM320-15  
 d) LM325H
77. The transfer function of a first order LPF is  
 a)  $\frac{A_0 W_h}{S + wh}$   
 b)  $\frac{A_0 Y_1 Y_2}{S}$   
 c)  $\frac{A_0(S^2 + W_0^2)}{(S + wh)}$   
 d)  $\frac{A_0 W h^2}{S^2 + \alpha W_0 s + wh^2}$
78. Polycrystalline silicon when doped with phosphorus is conductive as can be used as ----- instead of aluminium  
 a) gate electrode  
 b) drain electrode  
 c) source electrode  
 d) none of the above
79. 8096 microcontroller is  
 a) 8 bit  
 b) 16 bit  
 c) 4 bit  
 d) 32 bit
80. The multiplication time for 10 bit numbers with 1MHz clock will be  
 a) 32  $\mu$  sec  
 b) 20  $\mu$  sec  
 c) 21  $\mu$  sec  
 d) 22  $\mu$  sec
81. In boolean algebra, exclusive and coincidence operations are defined as below:  
 $X \oplus Y = X \text{ or } Y \text{ but not both}$   
 $X \odot Y = \text{either } (X.Y) \text{ or } (\bar{X}.\bar{Y})$ . Then the two expressions  $(X \oplus X + X \odot X)$  and  $(X \oplus 1 + X \odot 1)$  are  
 a) equal to 1  
 b) equal to 0  
 c) equal to x  
 d) equal to  $\bar{X}$
82. The technique used by the processor to allow bus access to any requesting device when the processor is not currently using the bus is called.  
 a) DMA  
 b) Bus arbitration  
 c) Pipelining  
 d) Bus segmentation
83. ORG, END, DS are  
 a) variable names  
 b) Pseudo instructions  
 c) assembler names  
 d) keywords of 8085

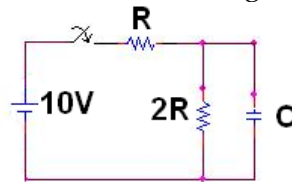
84. In 8051, the stack pointer is ----- before the data is stored and ----- while retrieving the data  
 a) incremented by 1, decremented by 1  
 b) decremented by 2, incremented by 2  
 c) incremented by 2, decremented by 2  
 d) decremented by 1, incremented by 1
85. In memory mapping, the unused address lines are connected to  
 a)  $\overline{CS}$                       b)  $\overline{CE}$                       c)  $R/\overline{W}$                       d) either a) or b)
86. RIM and SIM deals with  
 a) masking of interrupts                      b) pending of interrupts  
 c) serial data communication                      d) all the above
87. In 8096, Global interrupt control bit is  
 a) PSW .9                      b) PSW .1                      c) PSW .3                      d) PSW .6
88. The following is a hardware command to the processor  
 a) MOV A,B                      b) ORG                      c) DCR M                      d) SUB
89. What is the maximum value of a load which consume 500 K whr per day at a load factor of 0.40, if the consumer increases the load factor of 0.50 without increasing the maximum demand?  
 a) 52.08 KW                      b) 50.8 KW                      c) 4.5 KW                      d) 60 KW
90. A 100 km long transmission line is loaded at 110KV. If the loss at line is 5MW and the load is 150 MVA. The resistance of the line is  
 a) 8.06 ohms per phase                      b) 0.806 ohms per phase  
 c) 0.0806 ohms per phase                      d) 80.6 ohms per phase
91. A single phase transmission line of impedance  $j0.8\text{ohm}$  supplies a resistive load of 500A at 300V. The sending end power factor is  
 a) unity                      b) 0.8 lagging                      c) 0.8 leading                      d) 0.6 lagging
92. A medium line with parameters A, B, C, D extended by connecting a short line of impedance Z in series. The overall ABCD parameters of the series combination will be  
 a) A, AZ, C + D/Z, D                      b) A, AZ + B, C, CZ+D  
 c) A+BZ, B, B, C + DZ, D                      d) AZ, B, C/Z, D
93. In a string of suspension insulators, the voltage distribution across the different units of a string could be made uniform by the use of a grading ring, because it  
 a) forms capacitance with link pins to carry the charging current from link pins  
 b) forms capacitance which help to cancel the charging current from link pins  
 c) increases the capacitances  
 d) none of the above
94. A single phase over head line has two conductors of diameter 2 cm with a spacing 2m between centre. If the dielectric strength of air is 21 kv / cm, the line voltage for which corona will commence of the line, will be  
 a) 55KV                      b) 100.9 KV                      c) 110KV                      d) 11.8KV



**Electronics (Section code 04)**

1. Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  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  $\lambda$   
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)  $\text{cosec } t$                                       c)  $\sec t$                                       d)  $\tan t$

11. A network has 7 nodes and 5 independent loops. The number of branches in the network is  
 a) 13                                      b) 12                                      c) 11                                      d) 10
12. Twelve 1 Ohm resistance are used as edges to form a cube. The resistance between two diagonally opposite corners of the cube is  
 a)  $(5/6) \Omega$                                       b)  $1 \Omega$                                       c)  $(6/5) \Omega$                                       d)  $(3/2) \Omega$
13. Two 2H inductance coils are connected in series and are also magnetically coupled to each other, the coefficient of coupling being 0.1. The total inductance of the combination can be  
 a) 0.4H                                      b) 3.2H                                      c) 4.0H                                      d) 4.4 H
14. Superposition theorem is NOT applicable to networks containing  
 a) Non linear elements                                      b) Dependent voltage sources  
 c) Dependent current sources                                      d) Transformer
15. The time constant of the network shown in figure is

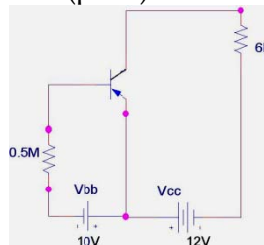


- a)  $2RC$                                       b)  $3RC$                                       c)  $RC/2$                                       d)  $2RC/3$
16. A major advantage of active filters is that they can be realized without using  
 a) op-amps                                      b) inductors                                      c) resistors                                      d) capacitors
17. Two impedance are connected in series. The 3 voltmeters, one connected across each impedances and one across the combination, read equal value. The phase angle between the voltage across the two impedance is  
 a)  $30^\circ$                                       b)  $60^\circ$                                       c)  $90^\circ$                                       d)  $120^\circ$
18. A Cut set has  
 a) always 2 or more tree branches                                      b) only one tree branch  
 c) only one tree link                                      d) None of the above
19. When Q factor of the circuit is high then  
 a) power factor of the circuit is high                                      b) Impedance of the circuit is high  
 c) Bandwidth is large                                      d) None of these
20. Which of the following theorem is a manifestation of the law of conservation of energy?  
 a) Tellegen's Theorem                                      b) Reciprocity Theorem  
 c) Thevenin's Theorem                                      d) Norton's Theorem
21. For an RC driver-point and impedance for the poles and zeros  
 a) should alternate on the real axis  
 b) should alternate only on the negative real axis  
 c) should alternate on the imaginary axis  
 d) can lie anywhere on the left half place



22. For a transfer function  $H(s) = P(s) / Q(s)$  where  $P(s)$  and  $Q(s)$  are polynomials in  $s$
- The degree of  $P(s)$  is always greater than degree of  $Q(s)$
  - The degree of  $P(s)$  and  $Q(s)$  are the same
  - The degree of  $P(s)$  is independent of the degree of  $Q(s)$
  - The maximum degree of  $P(s)$  and  $Q(s)$  differ at the most by one
23. Any semiconductor material has a valence of electrons
- 4
  - 6
  - 8
  - 3 or 5
24. The largest current flow of a bipolar transistor occurs
- in the emitter
  - in the base
  - in the collector
  - through the collector base
25. Which amplifier will be preferred for highest gain
- Darlington's pair
  - Cascade amplifier
  - Cascode amplifier
  - None of the above
26. All of the following are insulators except
- paper
  - paraffin oil
  - Tungsten
  - Glass
27. As compared to a CB amplifier, a CE amplifier has
- lower current amplification
  - higher current amplification
  - lower input resistance
  - higher input resistance
28. Linear MOS IC's
- Cannot use MOS load resistors
  - are not possible
  - are difficult to fabricate
  - can be designed to use direct connection between stages

29. Q point in circuit shown below ( $\beta=50$ )



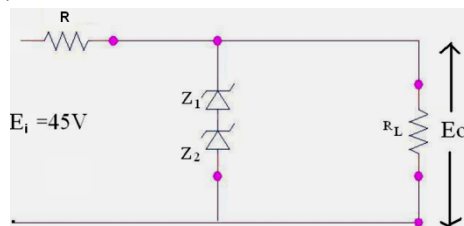
- 3V, 2mA
- 3V, 1mA
- 6V, 2mA
- 6V, 1mA

30. Value of  $\sigma_i$  for Si

- $1.4 \times 10^{-3} / \Omega\text{cm}$
- $4.4 \times 10^{-4} / \Omega\text{cm}$
- $6.4 \times 10^{-4} / \Omega\text{cm}$
- None

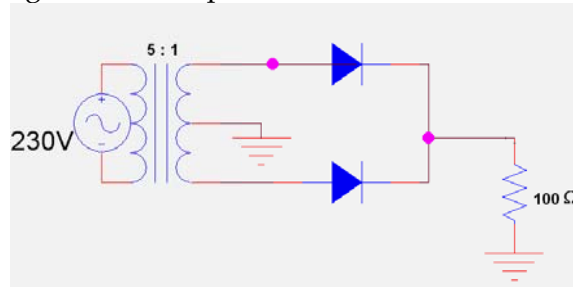
31. Regulated output voltage in circuit below

$Z_1, Z_2 = 200\text{mA}, 15\text{V}$



- 10V
- 20V
- 30V
- 40V

32. DC output voltage in centre tap circuit



- a) 10.7                      b) 15.7                      c) 20.7                      d) 25.7

33. Voltage gain of single stage amplifier if  $R_c=2K\Omega$ ,  $R_i=1K\Omega$  , current gain=50

- a) 50                      b) 100                      c) 150                      d) 200

34. Voltage gain in an inverting amplifier with  $R_i=1K\Omega$ ,  $R_f=2M\Omega$

- a) 1000                      b) 1500                      c) 2000                      d) 2500

35. An amplifier with resistive negative feedback has two left half plane poles in its open-loop transfer function. The amplifier

- a) will always be unstable at high frequencies  
 b) will be stable for all frequencies  
 c) may be unstable, depending on the feedback factor  
 d) will oscillate at low frequencies

36. Generally, the gain of a transistor amplifier falls at high frequencies due to the

- a) internal capacitances of the device                      b) coupling capacitor at the input  
 c) skin effect                      d) coupling capacitor at the output

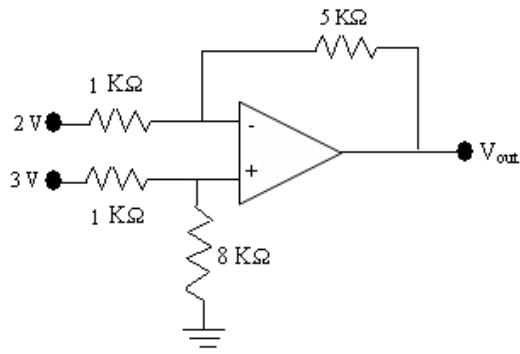
37. A bipolar transistor is operating in the active region with a collector current of 1 mA. Assuming that  $\beta$  of the transistor is 100 and thermal voltage ( $V_T$ ) is 25 mV, the transconductance ( $g_m$ ) and the input resistance ( $r_\pi$ ) of the transistor in the common emitter configuration, are

- a)  $g_m = 25 \text{ mA/V}$  and  $r_\pi = 15.625 \text{ k}\Omega$                       b)  $g_m = 40 \text{ mA/V}$  and  $r_\pi = 4.0 \text{ k}\Omega$   
 c)  $g_m = 25 \text{ mA/V}$  and  $r_\pi = 2.5 \text{ k}\Omega$                       d)  $g_m = 40 \text{ mA/V}$  and  $r_\pi = 2.5 \text{ k}\Omega$

38. The drain current of a MOSFET in saturation is given by  $I_D = K(V_{GS} - V_T)^2$  where K is a constant. The magnitude of the transconductance  $g_m$  is

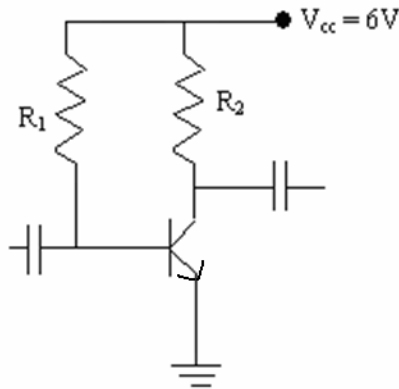
- a)  $\frac{K(V_{GS} - V_T)^2}{V_{DS}}$                       b)  $2K(V_{GS} - V_T)$   
 c)  $\frac{I_d}{V_{GS} - V_{DS}}$                       d)  $\frac{K(V_{GS} - V_T)^2}{V_{GS}}$

39. If op-amp in the figure is ideal, then output voltage  $V_{out}$  will be equal to



- a) 1 V                      b) 6 V                      c) 14 V                      d) 17 V

40. In the amplifier circuit shown in the figure the values of  $R_1$  and  $R_2$  are such that the transistor is operating at  $V_{CE} = 3V$  and  $I_C = 1.5\text{ mA}$  when its  $\beta$  is 150. For a transistor with  $\beta$  of 200, the operating point ( $V_{CE}, I_C$ ) is



- a) (2 V, 2 mA)              b) (3 V, 2 mA)              c) (4 V, 2 mA)              d) (4 V, 1 mA)

41. An n-channel JFET having a pinch-off voltage ( $V_P$ ) of -5V shows a transconductance ( $g_m$ ) of 1 mA/V, when applied gate-to-source voltage ( $V_{GS}$ ) is -3V. Its maximum transconductance (in mA/V) will be

- a) 1.5                      b) 2.0                      c) 2.5                      d) 3.0

42. If for an FET,  $g_m = 95\text{ mA/volt}$ , total capacitance = 500 pF, then for a voltage gain of -30, bandwidth will be

- a) 100 kHz                      b) 633kHz                      c) 3 MHz                      d) 19 MHz

43. A signal may have frequency components which lie in the range of 0.001 Hz to 10 Hz. Which of the following types of coupling should be chosen in a multistage amplifier designed to amplify this signal?

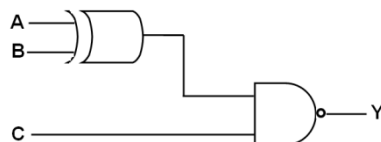
- a) RC coupling                      b) Transformer coupling  
c) Direct coupling                      d) Double-tuned coupling

44. Op-amp used as a tuned amplifier has the tuned circuit connected  
 a) across input  
 b) across series impedance at the input  
 c) across feedback impedance  
 d) across output
45. The bandwidth of an RF tuned amplifier is dependent on Q-factor of the  
 a) tuned output circuit  
 b) tuned input circuit  
 c) operating point  
 d) output and input circuits as well as quiescent operating point
46. If for an FET,  $g_m = 95 \text{ mA/volt}$ , total capacitance = 500 pF, then for a voltage gain of -30, bandwidth will be  
 a) 100 kHz  
 b) 633 kHz  
 c) 3 MHz  
 d) 19 MHz
47. 2's complement representation of a 16-bit number (one sign bit and 15 magnitude bits) is FFFF. Its magnitude in decimal representation is  
 a) 0  
 b) 1  
 c) 32,767  
 d) 65,535
48. The output of a logic gate is '1' when all its inputs are at logic '0'. Then gate is either  
 a) a NAND or an EX-OR gate  
 b) a NOR or an EX-NOR gate  
 c) an OR or an EX-NOR gate  
 d) an AND or an EX-OR gate
49. Choose the correct one from among the alternates A,B,C,D after matching an item from Group 1 with the most appropriate item in Group 2.

Group 1	Group 2
P : Shift Register	1 : Frequency Division
Q : Counter	2 : Addressing in Memory Chips
R : Decoder	3 : Serial to parallel data conversion

	P	Q	R
a)	3	2	1
b)	3	1	2
c)	2	1	3
d)	1	2	3

50. The Boolean expression for the output for the logic circuit shown in figure is



- a)  $\overline{Y} = \overline{A} B + A \overline{B} + \overline{C}$   
 b)  $\overline{Y} = A B + \overline{A} \overline{B} + C$   
 c)  $\overline{Y} = A B + \overline{A} B + C$   
 d)  $\overline{Y} = \overline{A} \overline{B} + \overline{A} B + C$



59. The channel capacity is exactly equal to  
 a) BW of demand  
 b) Amount of information per second  
 c) Noise ratio in the channel  
 d) None of these
60. Redundancy in communication system  
 a) Reduces efficiency of communication  
 b) Helps to detect errors  
 c) Helps to correct errors  
 d) All of these
61. The Fourier series of a odd periodic function, contains only  
 a) odd harmonics      b) cosine term      c) even harmonics      d) sine term
62. Convolution of  $x(t+5)$  with impulse function  $\delta(t-7)$  is equal to  
 a)  $x(t-12)$       b)  $x(t+12)$       c)  $x(t-2)$       d)  $x(t+2)$
63. A band-limited signal is sampled at the Nyquist rate. The signal can be recovered by passing the sample through  
 a) An RC filter  
 b) An envelope detector  
 c) A PLL  
 d) An ideal LPF with the appropriate BW
64. If  $x(t)$  is the linear input to a linear network whose impulse response  $h(t)$  is known, then assuming that the impulse applied at  $t=\lambda$  the output response  $y(t)$  will be (\* = convolution)  
 a)  $y(t)=x * h(t)$       b)  $y(t)=x(t-\lambda) * h(t)$   
 c)  $y(t)=x(\lambda) * h(t-\lambda)$       d)  $y(t)=x(t+\lambda) * h(t-\lambda)$
65. Consider the following statements regarding a discrete system with the output input relationship  $y(n)=x(n)+3$ . The system 1) is linear 2) is causal 3) has bonded for bonded input 4) is non-realizable  
 Of these statements  
 a) 1,2 and 3 are correct      b) 2 and 3 are correct  
 c) 1 and 2 are correct      d) 1, 3 and 4 are correct
66. The Laplace Transform method enables one to find the response of a network in  
 a) The transient state only  
 b) The steady state only  
 c) Both transient and steady states  
 d) The transient state provided sinusoidal forcing function do not exist
67. Match List -I (characteristics of  $f(t)$ ) with List -II (Function) and select the correct answer using the codes given below the lists:  
 List - I  
 A.  $f(t) [1 - \{u(t)\}] = 0$   
 B.  $f(t) + k [df(t) / dt] = 0$ ;  $k$  is a positive constant  
 C.  $f(t) + k [d^2 f(t) / dt^2] = 0$ ;  $k$  is a positive constant  
 D.  $f(t) [g(t) - f(0)] = 0$  for any arbitrary  $g(t)$

List - II

1. Decaying exponential
2. Growing exponential
3. Impulse
4. Causal
5. Sinusoid

Code:

	A	B	C	D
a)	4	1	5	3
b)	1	4	5	3
c)	1	2	5	3
d)	2	5	4	1

68. Which one of the following system is non linear? [y(t) =output; x(t)=input]
- a)  $y(t) = 2x(t-1)-3x(t-2)+x(t-3)$       b)  $y(t) = 5x(t)$   
c)  $y(t) = 2x(t-1)- x(t-2)- x(t-4)$       d)  $y(t)=2x(t)+ 3.6$
69. The signal  $x(t)=A \cos(\omega_0 t + \phi)$  is
- a) An energy signal      b) A power signal  
c) An energy as well as a power signal      d) Neither energy not a power signal
70. The impulse response of a system is  $h(t)= \delta(t-0.5)$ . If two such system are cascaded, the impulse response of the overall system will be
- a)  $0.5\delta(t-0.25)$       b)  $\delta(t-0.25)$       c)  $\delta(t-1)$       d)  $0.5\delta(t-1)$
71. The phase margin of a system with the open-loop transfer function
- $$G(s)H(s) = \frac{(1-s)}{(1+s)(2+s)}$$
- is
- a)  $0^\circ$       b)  $63.4^\circ$       c)  $90^\circ$       d)  $\infty$
72. A system has poles at 0.01 Hz, 1 Hz and 80 Hz; zeros at 5 Hz, 100 Hz and 200 Hz. The approximate phase of the system response at 20 Hz is
- a)  $-90^\circ$       b)  $0^\circ$       c)  $90^\circ$       d)  $-180^\circ$
73. A ramp input applied to a unity feedback system results in 5% steady state error. The type number and zero frequency gain of the system are respectively
- a) 1 and 20      b) 0 and 20      c) 0 and  $\frac{1}{20}$       d) 1 and  $\frac{1}{20}$
74. If the closed-loop transfer function of a control system is given as
- $$T(s) = \frac{s-5}{(s+2)(s+3)}$$
- then it is
- a) an unstable system      b) an uncontrollable system  
c) a minimum phase system      d) a non-minimum phase system

75. The transfer function of a linear system is
- ratio of the output,  $v_o(t)$ , and input  $v_i(t)$
  - ratio of the derivatives of the output and the input
  - ratio of the Laplace transform of the output and that of the input with all initial conditions zeros
  - none of these
76. The Nyquist plot of a loop transfer function  $G(j\omega)H(j\omega)$  system encloses the  $(-1, j0)$  point. The gain margin of the system is
- less than zero
  - zero
  - greater than zero
  - infinity
77. A system has a complex conjugate root pair of multiplicity two or more in its characteristics equation. The impulse response of the system will be
- a sinusoidal oscillation which decays exponentially; the system is therefore stable
  - a sinusoidal oscillation with time multiplier; the system is therefore unstable
  - a sinusoidal oscillation which rises exponentially with time; the system is therefore unstable
  - a dc term and harmonic oscillation; the system therefore becomes limitingly stable
78. For making an unstable system stable
- gain of the system should be increased
  - gain of the system should be decreased
  - number of zero to the loop transfer functions should be increased
  - number of poles to the loop transfer function should be increased
79. The characteristic equation of a feedback system is  $s^3 + Ks^2 + 5s + 10 = 0$ , For the system to be critically stable, the value of K should be
- 1
  - 2
  - 3
  - 4
80. The frequency range for satellite communication is
- 1 kHz to 100 kHz
  - 100 kHz to 10kHz
  - 10 MHz to 30 MHz
  - 1 GHz to 30 GHz
81. The input to a coherent detector is DSB-SC signal plus noise. The noise at the detector output is
- the in-phase component
  - the quadrature- component
  - zero
  - the envelope
82. A Hilbert transformer is a
- non-linear system
  - non-causal system
  - time-varying system
  - low-pass system



83. Four message band limited to  $\omega, \omega, 2\omega$  and  $3\omega$  respectively are to be multiplexed using Time Division Multiplexing (TDM). The minimum bandwidth required for transmission of this TDM signal is  
 a)  $\omega$                                       b)  $3\omega$                                       c)  $6\omega$                                       d)  $7\omega$
84. The probability of density function of the envelope of a sinusoidal signal along with narrow band noise follows which of the following distribution?  
 a) Gaussian                                      b) Rayleigh                                      c) Rician                                      d) Poisson
85. The autocorrelation function of white noise is  
 a) a delta function                                      b) a constant  
 c) Gaussian                                      d)  $\exp(-|t|)$  with usual notation
86. In the generation of modulated signal, a varactor diode can be used for  
 a) FM generation only                                      b) AM generation only  
 c) PM generation only                                      d) both b) and c)
87. A 60 Hz carrier is amplitude modulated by speech band of 300 to 3000 Hz. The range of upper side bands will be  
 a) 60.3 to 63 kHz                                      b) 60 to 59.7kHz                                      c) 57 to 59.7kHz                                      d) 56.7 to 56.3 kHz
88. If transmission bandwidth is doubled in FM, then SNR is  
 a) also doubled                                      b) improved four fold  
 c) decreased by one fourth                                      d) unaffected
89. In a FM demodulator  
 a) capacitors are charged to the amplitude of FM wave  
 b) frequency deviations are converted into voltage  
 c) simple diode as employed  
 d) none of these
90. The signal to quantization noise ratio in a PCM system depends upon  
 a) sampling rate                                      b) number of quantization levels  
 c) message signal bandwidth                                      d) none of these
91. A TDM link has 20 signal channels and each channel is sampled 8000 times/sec. each sample is represented by seven binary bits and contains an additional bit for synchronization. The total bit rate for the TDM link is  
 a) 1180 M bits/sec                                      b) 1280 K bits/sec  
 c) 1180 M bits/sec                                      d) 1280 M bits/sec
92. The electric field on x-axis due to a line charge extending from  $-\infty$  to  $\infty$  is  
 a)  $\frac{\rho_l}{2\pi\epsilon_o\rho}$                                       b)  $\frac{\rho_l}{2\epsilon_o\rho}$                                       c)  $\frac{\rho_l}{2\rho}$                                       d)  $\frac{\rho_l}{\epsilon_o\rho}$

93. Potential at all the points on the surface of a conductor is  
 a) the same                      b) no the same                      c) zero                      d) infinity
94. Gauss's law in point form is  
 a)  $\nabla \cdot D = \rho_v$                       b)  $\nabla \cdot D = \rho_s$                       c)  $\nabla \cdot D = Q$                       d)  $\nabla D = \rho_v$
95. The direction of propagation of EM wave is obtained from  
 a)  $E \times H$                       b)  $E \cdot H$                       c)  $E$                       d)  $H$
96. Electric flux density is  
 a)  $\frac{Q}{4\pi \epsilon_0 r^2}$                       b)  $\frac{Q}{4\pi r^2}$                       c)  $\frac{Q}{4\pi r^2} a_r$                       d)  $\frac{Q}{4\pi \epsilon_0 r^2} a_r$
97. Electric flux lines  
 a) originate at (+)ve charge  
 b) originate at (-)ve charge  
 c) are closed loops  
 d) originate at ((+)ve charge and also terminate are (+)ve charge
98.  $\oint (\nabla \times H) \cdot S$  is  
 a) zero                      b)  $I_{enc}$                       c)  $J$                       d)  $\oint H \cdot dS$
99.  $\nabla \times A$  is  
 a)  $H$                       b)  $B$                       c)  $J$                       d) 0
100.  $\oint B \cdot dS$  is  
 a) zero                      b)  $Q$                       c)  $H$                       d)  $J$

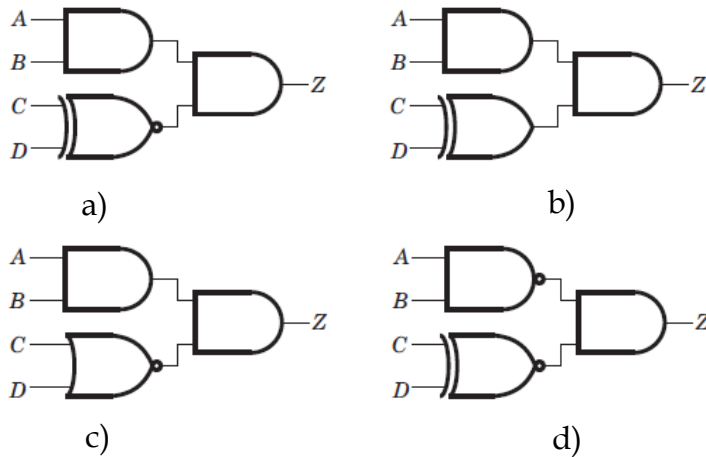
**Instrumentation (Section code 05)**

1. Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  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  $\lambda$   
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)  $\text{cosec } t$                                       c)  $\sec t$                                       d)  $\tan t$

11. The Ebers-Moll model is applicable to  
 a) Bipolar Junction Transistors                      b) NMOS Transistors  
 c) Unipolar Junction Transistors                    d) Junction Field-Effect Transistors
12. For a single BJT common base amplifier,  
 a) Current gain as well as voltage gain can be greater than unity  
 b) Current gain can be greater than unity but voltage gain is always less than unity  
 c) Voltage gain can be greater than unity but current gain is always less than unity  
 d) Current gain can be less than unity but voltage gain is always greater than unity
13. A thin film resistor is to be made from a GaAs film doped  $n$  - type. The resistor is to have a value of  $2 \text{ k}\Omega$ . The resistor length is to be  $200 \mu\text{m}$  and area is to be  $10^{-6} \text{ cm}^2$ . The doping efficiency is known to be 90%. The mobility of electrons is  $8000 \text{ cm}^2/\text{V} \cdot \text{s}$ . The doping needed is  
 a)  $8.7 \times 10^{15} \text{ cm}^{-3}$                                       b)  $8.7 \times 10^{21} \text{ cm}^{-3}$   
 c)  $4.6 \times 10^{15} \text{ cm}^{-3}$                                       d)  $4.6 \times 10^{21} \text{ cm}^{-3}$
14. In a BJT amplifier, with the introduction of feedback, the input impedance is reduced, output impedance is increased, bandwidth is increased and distortion is reduced. The feedback is  
 a) Voltage series                                              b) Current series  
 c) Voltage shunt                                              d) Current shunt
15. The internal resistance of a current source used in the model of a BJT while analyzing a circuit using BJT is  
 a) very high                      b) very low                      c) zero                      d) moderate
16. The peak inverse voltage rating of a diode in a bridge full wave rectifier is  $x$  times larger than that of a full-wave rectifier yielding the same dc output voltage, where the value of  $x$  is  
 a)  $\frac{1}{2}$                       b) 1                      c)  $\sqrt{2}$                       d) 2
17. A uniformly doped silicon  $pn$  junction has dopant profile of  $N_a = N_d = 5 \times 10^{16} \text{ cm}^{-3}$ . If the peak electric field in the junction at breakdown is  $E = 4 \times 10^5 \text{ V/cm}$ , the breakdown voltage of this junction is  
 a) 35 V                      b) 30 V                      c) 25 V                      d) 20 V
18. The following currents are measured in a uniformly doped  $npn$  bipolar transistor:  $I_{nE} = 1.20 \text{ mA}$ ,  $I_{pE} = 0.10 \text{ mA}$ ,  $I_{nC} = 1.18 \text{ mA}$ ,  $I_{RC} = 0.20 \text{ mA}$ ,  $I_G = 1 \mu\text{A}$ ,  $I_{pC0} = 1 \mu\text{A}$   
 The  $\beta$  is  
 a) 3.69                      b) 0.44                      c) 2.27                      d) 8.39

19. A computer has the following negative numbers stored in binary form as shown. The wrongly stored number is
- a) -37 as 1101 1011                      b) -89 as 1010 0111  
 c) -48 as 1110 1000                      d) -32 as 1110 0000

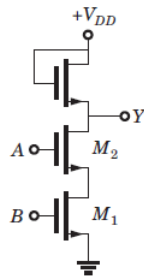
20. The output of logic circuit is HIGH whenever  $A$  and  $B$  are both HIGH as long as  $C$  and  $D$  are either both LOW or both HIGH. The logic circuit is



21. A 4 bit modulo-6 ripple counter uses  $JK$  flip-flop. If the propagation delay of each FF is 50 ns, the maximum clock frequency that can be used is equal to
- a) 5 MHz                      b) 10 MHz                      c) 4 MHz                      d) 20 Mhz

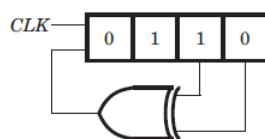
22. Four memory chips of 16 X 4 size have their address buses connected together. This system will be of size
- a) 64 X 4                      b) 32 X 8                      c) 16 X 16                      d) 256 X 1

23. The circuit shown in the figure is



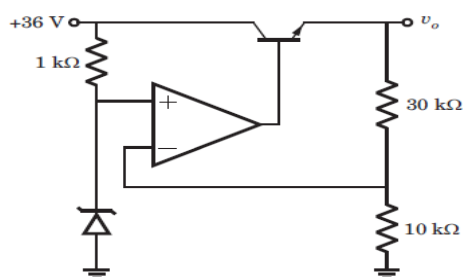
- a) NAND                      b) NOR                      c) AND                      d) OR

24. The initial contents of the 4-bit serial-in-parallel-out right-shift, register shown in the figure is 0 1 1 0. After three clock pulses are applied, the contents of the shift register will be



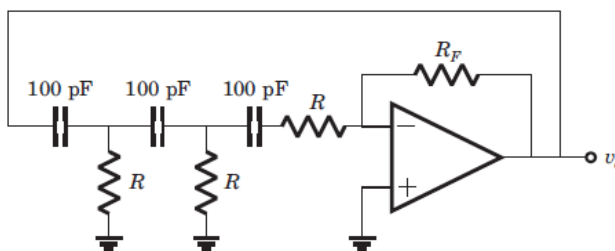
- a) 0 0 0 0                      b) 0 1 0 1                      c) 1 1 1 1                      d) 1 0 1 0

25. In the op-amp series regulator circuit of the figure,  $V_Z = 6.2\text{ V}$ ,  $V_{BE} = 0.7\text{ V}$  and  $\beta = 60$ . The output voltage  $v_o$  is



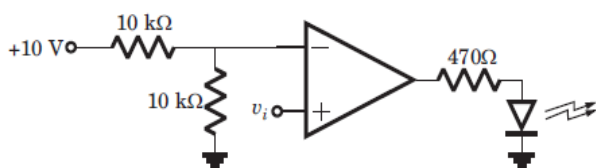
- a) 35.8 V      b) 24.8 V      c) 29.8 V      d) 39.8 V

26. This phase shift oscillator operates at  $f = 80\text{ kHz}$ . The value of resistance  $R_F$  is



- a) 148 kΩ      b) 236 kΩ      c) 438 kΩ      d) 814 kΩ

27. The LED in this circuit will be ON if  $v_i$  is



- a)  $> 10\text{ V}$       b)  $< 10\text{ V}$       c)  $> 5\text{ V}$       d)  $< 5\text{ V}$

28. 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

29. It is desired to multiply the number 0AH by 0BH and store the result in the accumulator. The numbers are available in register B and C respectively. A part of the 8085 program for this purpose is given below :

```

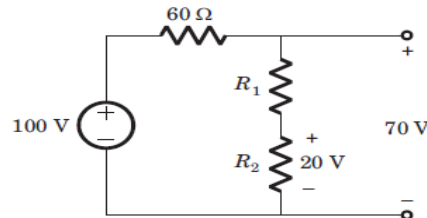
MVI A, 00H
LOOP: -----
-----
-----
-----
-----
HLT

```

The sequence of instruction to complete the program would be

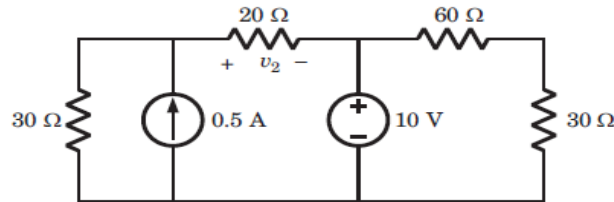
- |                                        |                                        |
|----------------------------------------|----------------------------------------|
| <p>a) JNZ LOOP<br/>ADD B<br/>DCR C</p> | <p>b) ADD B<br/>JNZ LOOP<br/>DCR C</p> |
| <p>c) DCR C<br/>JNZ LOOP<br/>ADD B</p> | <p>d) ADD B<br/>DCR C<br/>JNZ LOOP</p> |
30. The contents of accumulator after the execution of the following instruction will be  
MVI A, A7H  
ORA A  
RLC  
a) CFH                      b) 4FH                      c) 4EH                      d) CEH
31. An 8085 microprocessor based system uses a 4K x 8 bit RAM whose starting address is AA00H. The address of the last byte in this RAM is  
a) 0FJFF H                      b) 1000 H                      c) B9FF H                      d) BA00 H
32. When the RET instruction at the end of a subroutine is executed,  
a) The information where the stack is initialized 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
33. The vectored address corresponding to the software interrupt command RST7 in 8085 microprocessor is  
a) 0017H                      b) 0027H                      c) 0038H                      d) 0280H
34. In 8085 microprocessor, CY flag may be set by the instruction  
a) SUB                      b) INX                      c) CMA                      d) ANA
35. A Microprocessor with 12 address lines is capable of addressing \_\_\_\_\_ locations  
(A)1024                      b) 2048                      c) 4096                      d) 64
36. Peripherals are used for which of the following  
a) To ensure the security of the system  
b) To expand the computer's capabilities  
c) To ensure the secrecy of the program  
d) To scan the program
37. 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

38.  $R_1 = ?$



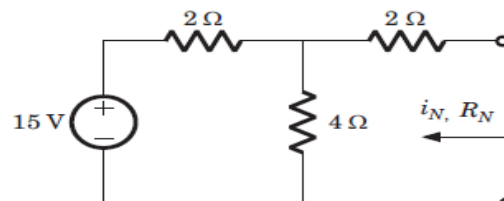
- a)  $25 \Omega$       b)  $50 \Omega$       c)  $100 \Omega$       d)  $2000 \Omega$

39.  $v_2 = ?$



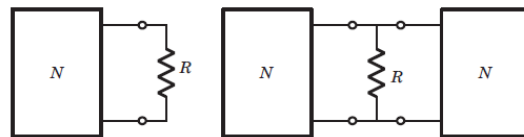
- a) 0.5 V      b) 1.0 V      c) 1.5 V      d) 2.0 V

40.  $i_N, R_N = ?$



- a) 3 A,  $10/3 \Omega$       b) 10 A,  $4 \Omega$       c) 1.5 A,  $6 \Omega$       d) 1.5 A,  $4 \Omega$

41. A network  $N$  feeds a resistance  $R$  as shown in figure. Let the power consumed by  $R$  be  $P$ . If an identical network is added as shown in figure, the power consumed by  $R$  will be

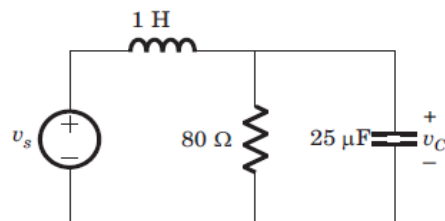


- a) equal to  $P$       b) less than  $P$   
c) between  $P$  and  $4P$       d) more than  $4P$

42. Given the h-parameters for common emitter  $h_{ie}=1000\Omega$ ,  $h_{fe}=49$ ,  $h_{oe}=1/40 \times 10^3$  and  $h_{re}=0$ , the values of  $h_{ib}$  and  $1/h_{ob}$  are given by

- a)  $1000\Omega$ ,  $40k\Omega$       b)  $20\Omega$ ,  $800\Omega$       c)  $50k\Omega$ ,  $40k\Omega$       d)  $20\Omega$ ,  $2M\Omega$

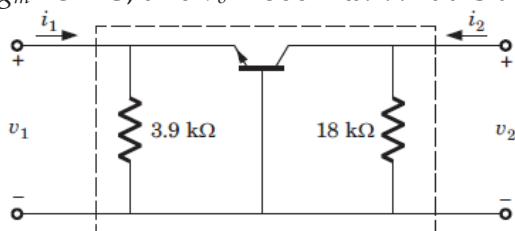
43. In the circuit shown below  $v_s=0$  for  $t>0$ . The initial condition are  $v(0) = 6V$  and  $dv(0)/dt = -3000 V/s$ . The  $v(t)$  for  $t > 0$  is



- a)  $-2 e^{-100t} + 8 e^{-400t} V$       b)  $6e^{-100t} + 8 e^{-400t} V$   
c)  $6e^{-100t} - 8 e^{-400t} V$       d)  $2 e^{-100t} + 8 e^{-400t} V$



44. The common-base amplifier is drawn as a two-port in figure. The parameters are  $\beta=100$ ,  $g_m=3\text{ mS}$ , and  $r_o=800\text{ K}\Omega$ . What is the h-parameter  $h_{21}$ ?



- a) 2.46                                      b) 0.9                                      c) 0.5                                      d) 0.67
45. In a photodiode, light is focused to fall on  
a) n-region                                      b) p-region  
c) full p and n region                                      d) junction region
46. A Bipolar junction transistor has  $\alpha = 0.99$ ,  $I_B = 25\mu\text{A}$  and  $I_{CBO} = 200\text{nA}$ . Then DC collector current is  
a) 2.475mA                                      b) 2.465mA                                      c) 2.485mA                                      d) 2.495mA
47. Silicon is preferred over Ge because  
a) Si has higher PIV                                      b) Si is found in abundance in nature  
c) Si is cost effective                                      d) Si has lower break down voltage
48. An amplifier of gain 10, with a gain-bandwidth product of 1 MHz and slew rate of  $0.1\text{ V}/\mu\text{s}$  is fed with a 10 KHz symmetrical square wave of  $\pm 1\text{ V}$  amplitude. Its output will be  
a)  $\pm 10\text{ V}$  amplitude square wave                                      b)  $\pm 2.5\text{ V}$  amplitude square wave  
c)  $\pm 10\text{ V}$  amplitude triangular wave                                      d)  $\pm 2.5\text{ V}$  amplitude triangular wave
49. A class A transformer coupled, transistor power amplifier is required to deliver a power output of 10W. The maximum power rating of the transistor should not be less than  
a) 5W                                      b) 10W                                      c) 20W                                      d) 40W
50. An n-Channel silicon ( $E_g=1.1\text{eV}$ ) MOSFET was fabricated using n+ poly-silicon gate and the threshold voltage was found to be 1V. Now, if the gate is change to p+ poly-silicon, other things remaining the same, the new threshold voltage will be  
a) -0.1V                                      b) 0V                                      c) 1.0V                                      d) 2.1V
51. In silicon at  $T = 300\text{ K}$  if the Fermi energy is 0.22 eV above the valence band energy, the value of  $p_0$  is  
a)  $2 \times 10^{15}\text{ cm}^{-3}$                                       b)  $10^{15}\text{ cm}^{-3}$   
c)  $3 \times 10^{15}\text{ cm}^{-3}$                                       d)  $4 \times 10^{15}\text{ cm}^{-3}$
52. A diode has reverse saturation current  $I_s = 10^{-10}\text{ A}$  and non ideality factor  $\eta=2$ . If diode voltage is 0.9 V, then diode current is  
a) 11 mA                                      b) 35 mA                                      c) 83 mA                                      d) 143 mA

53.  $\beta$  of a transistor  
 a) decreases with increase of temperature  
 b) increases with increase of temperature  
 c) remains same with increase of temperature  
 d) varies depending on  $G_m$
54. A common source JFET amplifier has a load resistance  $R_L=500K\Omega$ ,  $r_d=100K\Omega$  and  $\mu=24$ . The voltage gain is  
 a) 30                      b) 25                      c) 20                      d) 40
55. INTEL8031 is  
 a) microcontroller                      b) microprocessor  
 c) USART                      d) PPI
56. The accuracy is specified as  $\pm 0.5\%$  of true value .At 5% of full scale the error of the instrument will be  
 a)  $\pm 0.025\%$                       b)  $\pm 0.5\%$                       c)  $\pm 2.5\%$                       d)  $\pm 25\%$
57. The smallest measurable input change is  
 a) Resolution                      b) Discrimination  
 c) Either A or B                      d) Threshold
58. The steady state error of a second order system is 0.02. If both viscous friction constant and spring constant are doubled , the steady state error will become  
 a) 0.0025                      b) 0.01                      c) 0.02                      d) 0.04
59. The damped oscillations of a second order system is 18 rad/s .The value of damping factor is 0.0866.The natural frequency of oscillation will be  
 a) 9rad/s                      b) 14.14rad/s                      c) 18rad/s                      d) 36rad/s
60. The inverse transducer is  
 a) Potentiometer                      b) LVDT  
 c) Both A and B                      d) Piezoelectric Crystals
61. The strip chart recorder is an  
 a) active transducer                      b) inverse transducer  
 c) output transducer                      d) Both b) and c)
62. A resistance potentiometer is a zero order instrument with increase of load to potentiometer resistance, its non-linearity  
 a) decreases  
 b) increases  
 c) increase as square root of the resistance  
 d) remains constant
63. In a resistance potentiometer, the high value of resistance POT leads to  
 a) Low value of error                      b) Low value of non- linearity  
 c) Both a) and b)                      d) High value of sensitivity

64. Capacitive transducers  
 a) are used for static measurement  
 b) are used for static and dynamic measurement  
 c) act as high pass filters  
 d) act as notch filter
65. The order of displacement measured by a capacitive transducer is  
 a) 1 pm                      b) 1 nm                      c) 1  $\mu\text{m}$                       d) 1mm
66. The Characteristic equation of a system is  $S^4+6S^3+11S^2+6S+k = 0$   
 In order to ensure that the system be stable, k must be  
 a) greater than zero and less than 10      b) unity  
 c) less than zero and greater than 10      d) zero
67. Routh Hurwitz criterion gives  
 a) roots in right half of s- plane  
 b) roots in left half of s- plane  
 c) roots in right half of s- plane and/or roots on imaginary axis  
 d) roots in left half of s- plane and/or roots on imaginary axis
68. In a open loop system the control action  
 a) depends on the input signal  
 b) depends on system variables  
 c) depends on size of the system  
 d) is independent of the output
69. The main application of transfer function is in the study of  
 a) steady behaviours of systems  
 b) steady as well as transient behaviours of systems  
 c) only transient behaviours of systems  
 d) neither steady nor transient behaviours of systems
70. At what frequency does the output variable oscillate in responding to a step command before reaching steady state?  
 a) 1.5 rad/s                      b) 3rad/s                      c) 5 rad/s                      d) 10 rad/s
71. The damping factor of a system is unity. The system is  
 a) over damped                                      b) critically damped  
 c) under damped                                      d) unstable
72. A Stepper motor is  
 a) a two phase induction motor  
 b) a kind of rotating amplifier  
 c) an electromagnetic transducer commonly used to convert an angular position of a shaft into an electrical system  
 d) an electromechanical device which actuates a train of step angular (or linear) movements in response to a train of input pulses on one to one basis.

73. The bode plot of the transfer function  $G(s) = S$  is  
 a) Constant magnitude and constant phase shift angle  
 b) -20 db/decade and constant phase shift angle  
 c) 20 db/decade and phase shift of  $\pi/2$   
 d) Zero magnitude and phase shift
74. It can be concluded that as a result of introducing D controller, the system becomes  
 a) damped  
 b) under over damped
75. The effect of addition of pole and zero on phase margin and gain margin can be most conveniently seen in  
 a) Nyquist plot  
 b) Bode plot  
 c) Root locus  
 d) Routh Hurwitz
76. A Strip chart recorder is  
 a) an active transducer  
 b) an inverse transducer  
 c) an output transducer  
 d) Both b) and c)
77. Newton's rings are formed when an air film is enclosed between  
 a) two convex surfaces  
 b) plane and concave surfaces  
 c) two concave surfaces  
 d) plane and convex surfaces
78. The upper limit of frequency of continuous X-rays produced in an X-Ray tube is determined by  
 a) force with which electrons strike the target  
 b) momentum of electrons  
 c) energy of electrons  
 d) applied voltage
79. Which of the following device is used for the measurement of low pressures below atmospheric pressure  
 a) Pirani gauge  
 b) Strain gauge  
 c) Ionization gauge  
 d) Compound gauge
80. Which of the following devices can be used to give an indication for temperature changes?  
 a) Bourdon gauge  
 b) Thermistor  
 c) Thermocouple  
 d) All of these
81. Average life of a radioactive substance with half life as 50 days is  
 a) 42.15 days  
 b) 52.15 days  
 c) 62.15 days  
 d) 72.15 days
82. Percentage of blood volume in platelets when diameter of platelet is about  $2\mu\text{m}$  is  
 a) 0.1%  
 b) 0.7%  
 c) 0.5%  
 d) 0.8%



94. A double beam oscilloscope has  
 a) two horizontal deflection plates      b) two electron guns  
 c) two different phosphor coatings      d) two screens
95. A Power factor has  
 a) four control springs      b) two control springs  
 c) one control springs      d) no control springs
96. Integral error compensation in a control system  
 a) minimizes steady state error      b) increases offset error  
 c) increases steady error      d) has no effect on steady error
97. The inherent characteristics of a digital controller is that it accepts  
 a) sampled data      b) analog data  
 c) intermittent data      d) sampled or discrete data
98. For handling multiple input, multiple output system the following approach is utilized  
 a) Bode plot      b) Nyquist plot  
 c) Root locus technique      d) State variable approach
99. For the design of an electronic PID controller the required number of operational amplifier is  
 a) 2      b) 1      c) 6      d) 3
100. In this system is viewed as a processor of sinusoidal input signals to generate the frequency response it would be a  
 a) low pass filter      b) band pass filter  
 c) unstable filter      d) stable filter

\*\*\*\*\*

Computer Science (Section code 06)

- Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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
- 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)  $3xy^2 - y^3 + 5x + c$
- The particular integral of  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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)  $\frac{1}{30}(\cos 3x - \sin 3x)$
- 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
- if  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  is  
a)  $6(x+y+z)$                                       b)  $6(x-y-z)$                                       c)  $3(x+y+z)$                                       d)  $2(x+y+z)$
- If X is a poisson variate such that  $P(X=1)=\frac{3}{10}$  and  $P(X=2)=\frac{1}{5}$ , find  $\lambda$   
a)  $\frac{3}{4}$                                       b)  $\frac{3}{2}$                                       c)  $\frac{4}{3}$                                       d)  $\frac{1}{4}$
- 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)  $\begin{pmatrix} -2 & -2 \\ 0 & -6 \end{pmatrix}$
- 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)  $\frac{\pi}{32}$
- 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)  $z = -1$
- If  $x = a(\cos t + t \sin t)$ ,  $y = a(\sin t - t \cos t)$ , find  $\frac{dy}{dx}$   
a)  $\cot t$                                       b)  $\text{cosec } t$                                       c)  $\sec t$                                       d)  $\tan t$

11. Which stack is used in 8085?  
a) FIFO  
b) LIFO  
c) FILO  
d) none of the above
12. 1Address line for RST3 is?  
a) 0020H                      b) 0028H                      c) 0018H
13. The advantage of memory mapped I/O over I/O mapped I/O is,  
a) Faster  
b) Many instructions supporting memory mapped I/O  
c) Require a bigger address decoder  
d) All the above
14. In 8086 microprocessor the following has the highest priority among all type interrupts  
a) NMI                      b) DIV 0                      c) TYPE 255                      d) OVER FLOW
15. Registers, which are partially visible to users and used to hold conditional, are known as  
a) PC                                              b) Memory address registers  
c) General purpose register                      d) Flags
16. One of the main features that distinguish microprocessors from micro-computers is  
a) Words are usually larger in microprocessors  
b) Words are shorter in microprocessors  
c) Microprocessor does not contain I/O devices  
d) Exactly the same as the machine cycle time
17. What type of control pins is needed in a microprocessor to regulate traffic on the bus, in order to prevent two devices from trying to use it at the same time?  
a) Bus control                                              b) Interrupts  
c) Bus arbitration                                              d) Status
18. When was the world's first laptop computer introduced in the market and by whom?  
a) Hewlett-Packard 1980                                              b) Epson, 1981  
c) Laplink traveling software Inc. 1982                      d) Tandy model-2000, 1985
19. A digital computer did not score over an analog computer in terms of  
a) Speed                      b) Accuracy                      c) Reliability                      d) Cost
20. How many buses are connected as part of the 8085A microprocessor?  
a) 2                      b) 3                      c) 5                      d) 8
21. The \_\_\_\_\_ ensures that only one IC is active at a time to avoid a bus conflict caused by two ICs writing different data to the same bus.  
a) Control bus                                              b) Control instructions  
c) address decoder                                              d) CPU



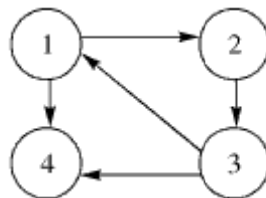


30. Which of the following is not a weighted code?  
 a) Decimal Number system                      b) Excess 3-cod  
 c) Binary number System                      d) None of these
31. If memory access takes 20 ns with cache and 110 ns with out it, then the ratio ( cache uses a 10 ns memory) is  
 a) 93%                      b) 90%                      c) 88%                      d) 87%
32. Von Neumann architecture is  
 a) SISD                      b) SIMD                      c) MIMD                      d) MISD
33. In signed-magnitude binary division, if the dividend is  $(11100)_2$  and divisor is  $(10011)_2$  then the result is  
 a)  $(00100)_2$                       b)  $(10100)_2$                       c)  $(11001)_2$                       d)  $(01100)_2$
34. If the main memory is of 8K bytes and the cache memory is of 2K words. It uses associative mapping. Then each word of cache memory shall be  
 a) 11 bits                      b) 21 bits                      c) 16 bits                      d) 20 bits
35. Logic X-OR operation of  $(4ACO)_H$  &  $(B53F)_H$  results  
 a) AACB                      b) 0000                      c) FFFF                      d) ABCD
36. The multiplicand register & multiplier register of a hardware circuit implementing booth's algorithm have  $(11101)_2$  &  $(1100)_2$ . The result shall be  
 a)  $(812)_{10}$                       b)  $(-12)_{10}$                       c)  $(12)_{10}$                       d)  $(-812)_{10}$
37. The maximum addressing capacity of a micro processor which uses 16 bit database & 32 bit address base is  
 a) 64 K.                      b) 4 GB.                      c) both a) & b).                      d) None of these.
38. A Program Counter contains a number 825 and address part of the instruction contains the number 24. The effective address in the relative address mode, when an instruction is read from the memory is  
 a) 849.                      b) 850.                      c) 801.                      d) 802.
39. The cache memory of 1K words uses direct mapping with a block size of 4 words. How many blocks can the cache accommodate.  
 a) 256 words.                      b) 512 words.                      c) 1024 words.                      d) 128 words.
40. How many flip-flops are required to produce a divide-by-32 device?  
 a)4                      b) 6                      c)5                      d) 7
41. Which of the following can prevent deadlocks?  
 a) semaphores                      b) interrupts  
 c) system calls                      d)none of the above
42. To avoid the race condition, the number of processes that may be simultaneously inside their critical section is  
 a)8                      b)1                      c)16                      d)0

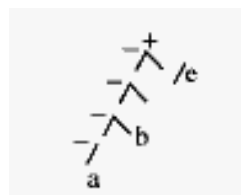




57. Following operations are performed on a stack , Push(1), Push(2), pop, push(1),Push(2), Pop,Pop,Pop, Push(2), Pop. The sequence of the popped out values are  
 a)2,2,1,2,2                      b)2,2,1,1,2                      c)2,1,2,2,1                      d)2,1,2,2,2
58. Average successful search time of a sequential search of n items is  
 a)  $n/2$                       b)  $(n+1)/2$                       c)  $(n-1)/2$                       d)  $\log(n)+1$
59. Four algorithms A1,A2,A3 and A4 solve a problem with order  $\log(n)$ ,  $\log \log (n)$   $n \log(n)$ ,  $n$ . Which is the best algorithm  
 a)A1                      b)A2                      c)A3                      d)A4
60. Running time  $T(n)$  where n is the input size of the recursive algorithm is as follows:  $T(n)=c+T(n-1)$  if  $n>1$  and  $T(n)=d$  if  $n<1$ . The order of the algorithm is  
 a) $n^2$                       b)n                      c) $n^3$                       d) $n^n$
61. Average number of comparisons performed by merge sort algorithm in merging two sorted list of length 2 is  
 a)8/3                      b)8/5                      c)11/3                      d)11/6
62. The order of binary search algorithm is  
 a)n                      b) $n^2$                       c) $n \log n$                       d) $\log n$
63. Which of the following abstract data types can be used for many to many relations?  
 a)Tree                      b)stack                      c)graph                      d)queue
64. In the following graph which is valid strong component?



- a)1,3,4                      b) 1,2,4                      c)2,3,4                      d)1,2,3
65. Following tree gives 1 after evaluation



- The values of the variable are  
 a) $a=-b,e=0$                       b)  $a=-b,e=1$                       c)  $a=b,e=0$                       d)  $a=b,e=1$

66. Number of leaf nodes in a 3-nary tree with 6 internal nodes is  
 a)10                      b)23                      c)17                      d)13
67. The first fit strategy  
 a) Uses linked list for implementation  
 b) Finds first block in the free list of size greater than desired size  
 c) Both a&b  
 d) None of the above
68. The worst case complexity to find max element in an array is  
 a) $W(n)=n-1$               b) $W(n)=0$               c) $W(n)=n$               d) $W(n)=n/2$
69. If a numeric field has a width of 5.2, then the value of field could be  
 a)23.10                      b)121.8                      c)143.87                      d)both a) & b)
70. Consider a linked list of n elements. What is the time taken to insert an element after an element pointed by some pointer?  
 a)  $O(1)$                       b)  $O(n \log 2)$                       c)  $O(n)$                       d)  $O(n \log n)$
71. 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  $\diamond * \diamond$  denotes natural join?  
 a)8,8                      b)120,8                      c)960,8                      d)960,120
72. The DBMS that is most difficult to use is  
 a) Microsoft's SQL Server                      b) Microsoft's Access  
 c) IBM's DB2                      d) Oracle Corporation's Oracle
73. 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
74. 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.
75. Most of the time, modification anomalies are serious enough that tables should be normalized into  
 a)1 NF                      b) 2NF                      c)3NF                      d)BCNF

76. A functional dependency is a relationship between or among:  
 a) tables                      b) rows                      c) relations                      d) attributes
- If attributes A and B determine attribute C, then it is also true that:  
 a)  $A \rightarrow B$                       b)  $A \rightarrow C$   
 c) A,B is a composite determinant                      d) C is a determinant.
77. Which type of entity has its relationship to another entity determined by an attribute in that other entity called a discriminator?  
 a) Supertype entity                      b) Subtype  
 c) Archetype entity                      d) Instance entity
78. 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) Nonrepeatable read                      b) Phantom read  
 c) Dirty read                      d) Consistent read
79. 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
80. Each answer below shows example data from a table. Which answer is an example of the inconsistent values problem?  
 a) Three columns have the values 534-2435, 534-7867, and 546-2356 in the same row.  
 b) Three rows have the values Brown Small Chair, Small Chair Brown, and Small Brown Chair in the same column.  
 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.
81. 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
82. The transaction allowed to occur by a shared lock is  
 a) Delete                      b) Insert                      c) read                      d) update
83. 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 ODBC core API

84. If we need to enforce resource limits for a specific profile, when command should be given to enable this enforcement for the instance  
 a)after system      b)after profile      c)after database      d)after resources
85. Which of the following products was the first to implement true relational algebra in a PC DBMS?  
 a)IDBMS      b)Oracle      c)dBase-II      d)R-Base
86. How many digits of the DNIC (Data Network Identification Code) identify the country?  
 a)first three      b)first four  
 c)first five      d)none of the above
87. The probability that a single bit will be in error on a typical public telephone line using 4800 bps modem is  $10^{-3}$ . If no error detection mechanism is used, the residual error rate for a communication line using 9-bit frames is approximately equal to  
 a)0.003      b)0.009  
 c)0.991      d)none of the above
88. You have a class A network address 10.0.0.0 with 40 subnets, but are required to add 60 new subnets very soon. You would like to still allow for the largest possible number of host IDs per subnet. Which subnet mask should you assign?  
 a)255.240.0.0      b)255.248.0.0      c)255.252.0.0      d)255.254.0.0
89. What are the most commonly used transmission speeds in BPS used in data communication?  
 a)300      b)1200      c)2400      d)9600
90. Avalanche photodiode receivers can detect hits of transmitted data by receiving  
 a)100 photons      b)200 photons  
 c)300 photons      d) None of the above
91. What part of 192.168.10.51 is the Network ID, assuming a default subnet mask?  
 a)192      b)192.168.10      c)0.0.0.5      d)51
92. A noiseless 3 KHz Channel transmits bits with binary level signals. What is the maximum data rate?  
 a)3 kbps      b)6 kbps      c)12 kbps      d)24 kbps
93. What can greatly reduce TCP/IP configuration problems?  
 a)WINS Server      b)WINS Proxy      c)DHCP Server      d)PDC
94. What is the port number for NNTP?  
 a)119      b)79      c)100`      d)212



95. Eight stations are competing for the use of a shared channel using the 'Adaptive tree Walk Protocol'. If the stations 7 and 8 are suddenly become ready at once, how many bit slots are needed to resolve the contention?  
a)7 slots                      b)5 slots                      c)10 slots                      d)14 slots
96. Usually, it takes 10-bits to represent one character. How many characters can be transmitted at a speed of 1200 BPS?  
a)10                              b)20                              c)120                              d)1200
97. With an IP address of 100, you currently have 80 subnets. What subnet mask should you use to maximize the number of available hosts?  
a)192                              b)224                              c)240                              d)252
98. The geostationary satellite used for communication systems  
a) rotates with the earth  
b) remains stationary relative to the earth  
c) is positioned over equator  
d) All of the above
99. The \_\_\_\_\_ houses the switches in token ring.  
a)Transceiver                      b)nine-pin connector  
c)MAU                                  d)NIC
100. The maximum recommended segment length for UTP is  
a) 200 metres                      b) 100 metres                      c) 500 meters                      d) 1000 meters

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**Chemical (Section code 07)**

1. Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  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  $\lambda$   
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)  $\text{cosec } t$                                       c)  $\sec t$                                       d)  $\tan t$

11. In case of a solution (not of a solid in a liquid), whose total volume is less than the sum of the volumes of its components in their pure states, solubility is
  - a) independent of temperature
  - b) increased with decrease in pressure
  - c) increased with rise in pressure
  - d) unchanged with pressure change
12. A solution which contains the maximum amount of solute that can be dissolved in a given amount of the solvent at a particular temperature is called
  - a) Concentrated solution
  - b) saturated solution
  - c) Molar solution
  - d) molal solution
13. If the pH of a solution is 6.2, then pOH is equal to
  - a) 14
  - b) 6.2
  - c) 7.8
  - d) 13.2
14. Ratio which defines the recycle ratio in a chemical process is
  - a) gross feed stream/recycle feed stream
  - b) recycle stream/fresh feed stream
  - c) recycle stream/gross feed stream
  - d) fresh feed stream/recycle stream
15. In a chemical process, the recycle stream is purged for
  - a) increasing the yield
  - b) enriching the product
  - c) limiting the inerts
  - d) heat conservation
16. The major constituent in black liquor is
  - a) sodium carbonate
  - b) sodium sulphate
  - c) silica
  - d) iron oxide
17. The unit of molality is
  - a) mole/kg
  - b) mole/litre of solution
  - c) g/litre of solution
  - d) kg/litre of solution
18. Kopp's rule is concerned with the calculation of
  - a) Thermal conductivity
  - b) heat capacity
  - c) Viscosity
  - d) surface tension
19. An ideal solution follows
  - a) Boyle's law
  - b) Amgat's law
  - c) Raoult's law
  - d) Trouton's rule
20. Fuels which requires maximum amount of 'excess air' for complete combustion is
  - a) solid
  - b) liquid
  - c) gaseous
  - d) nuclear
21. For the laminar flow of a fluid in a circular pipe of radius R, the Hagen-Poiseuille equation predicts the volumetric flowrate to be proportional to
  - a) R
  - b) R<sup>2</sup>
  - c) R<sup>4</sup>
  - d) R<sup>0.5</sup>
22. In Hagen-Poiseuille flow through a cylindrical tube, the radial profile of shear stress
  - a) constant
  - b) cubic
  - c) parabolic
  - d) linear
23. In pipe flow heat is transferred from hot wall to the liquid by
  - a) conduction only
  - b) forced convection only
  - c) forced convection and conduction
  - d) free and forced convection





49. The highest value of thermal conductivity is expected for  
 a) solid ice                      b) water                      c) steam                      d) superheated steam
50. Air at 20°C blows over a plate of 50 cm × 75 cm maintained at 250°C. If the convection heat transfer coefficient is 25 w/m<sup>2</sup> °C, the heat transfer rate is  
 a) 215.6 kW                      b) 2156 kW                      c) 2.156 kW                      d) 21.56 kW
51. Sudden bursting of a cycle tube is an  
 a) isothermal process                      b) adiabatic process  
 c) isobaric process                      d) isochoric process
52. After throttling, gas temperature  
 a) decreases                      b) increases                      c) remains same                      d) uncertain
53. The number of degrees of freedom at the triple point of water is  
 a) 0                      b) 1                      c) 2                      d) 3
54. The Mollier chart is  
 a) Pressure-enthalpy chart                      b) Enthalpy-entropy chart  
 c) Temperature-entropy chart                      d) Pressure-volume chart
55. For a real gas the fugacity coefficient is always  
 a) equal to one                      b) less than one                      c) greater than one                      d) uncertain
56. Gibbs free energy of mixing at constant temperature and pressure must always be  
 a) zero                      b) positive                      c) negative                      d) infinity
57. A nozzle is a device which  
 a) reduces kinetic energy and increases pressure  
 b) increases kinetic energy and decreases pressure  
 c) increases kinetic energy as well as pressure  
 d) reduces kinetic energy as well as pressure
58. Critical pressure ratio for the flow of saturated steam through a converging nozzle is  
 a) 1                      b) >1                      c) <1                      d) >>1
59. The principle of refrigeration is based on  
 a) zeroth law of thermodynamics                      b) first law of thermodynamics  
 c) second law of thermodynamics                      d) third law of thermodynamics
60. In steam jet referigerators, the refrigerating fluid is practically always  
 a) steam                      b) water                      c) ice                      d) brine
61. Match the variation of mass transfer coefficient given by the theory in Group I with the appropriate variation in Group II
- | Group I |                       | Group II |                        |
|---------|-----------------------|----------|------------------------|
| (P)     | Film Theory           | (1)      | $\propto D_{AB}$       |
| (Q)     | Penetration Theory    | (2)      | $\propto D_{AB}^{2/3}$ |
| (R)     | Boundary layer Theory | (3)      | $\propto D_{AB}^{1/2}$ |
- a) P-1, Q-2, R-3                      b) P-2, Q-1, R-3  
 c) P-1, Q-3, R-2                      d) P-3, Q-2, R-1

62. If the amount of the steam used in steam distillation is increased, the temperature of distillation  
 a) increases  
 b) decreases  
 c) remains unchanged  
 d) depend on relative volatility
63. The same diameter columns which give lowest pressure drop per unit height is  
 a) bubble-cap column  
 b) sieve-plate column  
 c) packed column  
 d) randomly packed column
64. At total reflux the capacity of a distillation column is  
 a) zero  
 b) maximum  
 c) minimum  
 d) optimum
65. Stripping is an  
 a) isothermal process  
 b) exothermic process  
 c) endothermic process  
 d) autocatalytic process
66. Wetted wall column experimentally determines  
 a) mass transfer coefficient  
 b) diffusion coefficient  
 c) relative volatility  
 d) number of transfer units
67. Vapor free gas means  
 a) 0% humidity  
 b) 100% humidity  
 c) 1% humidity  
 d) between 0 and 100% humidity
68. The dew point of saturated gas phase equals to  
 a) 0°C  
 b) 25°C  
 c) gas temperature  
 d) bubble temperature
69. The Hatta number plays an important role in problems of  
 a) gas absorption without chemical reaction  
 b) gas absorption with chemical reaction  
 c) multicomponent distillation without chemical reaction  
 d) solvent extraction
70. All moisture in a non-hygroscopic material is  
 a) bound moisture  
 b) free moisture  
 c) unbound moisture  
 d) equilibrium moisture
71. Which of the systems having the following transfer function is stable?  
 a)  $\frac{1}{S^2 + 2}$   
 b)  $\frac{1}{S^2 - 2S + 3}$   
 c)  $\frac{1}{S^2 + 2S + 2}$   
 d)  $\frac{e^{-20s}}{S^2 + 2S - 1}$
72. For an input function  $X(t) = 2t^2$ , laplace transform of this function is  
 a)  $\frac{2}{S^2}$   
 b)  $\frac{4}{S^2}$   
 c)  $\frac{2}{S^3}$   
 d)  $\frac{4}{S^3}$

73. The offset for P controller is  
 a) maximum  
 b) minimum  
 c) zero  
 d) moderate
74. Addition of derivative control mode to the proportional mode for PD controller decreases  
 a) derivative time  
 b) integral time  
 c) offset  
 d) oscillation
75. The variation of controlled variable with load variable for fixed value of set point is known as  
 a) servomechanism control problem  
 b) regulator control problem  
 c) supervisory control  
 d) DDC
76. The steam temperature in the tank heater is  
 a) controlled variable  
 b) manipulated variable  
 c) load variable  
 d) error
77. Tachometer and stroboscope are used to measure  
 a) liquid level  
 b) speed  
 c) moisture  
 d) composition
78. In cascade control generally the controller used in the secondary loop is  
 a) P controller  
 b) PI controller  
 c) PD controller  
 d) PID controller
79. The system exhibiting unbounded response to a unbounded input is  
 a) unstable  
 b) stable  
 c) non-oscillatory  
 d) bounded output
80. The transfer function for a PD controller is  
 a)  $K_C(1 + \tau_D S)$   
 b)  $K_C \left(1 + \frac{1}{\tau_D S}\right)$   
 c)  $K_C(\tau_D S)$   
 d)  $\frac{K_C}{\tau_D S}$
81. Screen having maximum capacity is  
 a) grizzlies  
 b) trommels  
 c) shaking screen  
 d) vibrating screen
82. Opening of 400 mesh screen (Taylor screen) is  
 a) 0.38 mm  
 b) 0.038 mm  
 c) 0.0038 mm  
 d) 3.8 mm
83. A fluid energy mill is used for  
 a) cutting  
 b) grinding  
 c) ultra grinding  
 d) crushing
84. Mesh is defined as the number of openings per linear  
 a) feet of screen surface  
 b) inch of screen surface  
 c) meter of screen surface  
 d) centimeter of screen surface





95. With increase in the discounted cash flow rate of return, the ratio of the total present value to the initial investment of a given project
- a) decreases
  - b) increases
  - c) increases linearly
  - d) remains constant
96. Most commonly used, rubber vulcanizing agent is
- a) sulphur
  - b) bromine
  - c) platinum
  - d) alumina
97. Glycerine can be from
- a) Fat
  - b) naphthalene
  - c) cumene
  - d) sucrose
98. Main constituent of cotton seed oil is
- a) acetic acid
  - b) linoleic acid
  - c) palmitic acid
  - d) oleic acid
99. Soda ash is produced by
- a) chamber process
  - b) solvay process
  - c) contact process
  - d) chance process
100. Main constituents of cotton fibre is
- a) lignin
  - b) cellulose
  - c) starch
  - d) gelatine

### Bio Technology (Section code 08)

- DNA duplication occurs in
  - Mitosis only
  - Meiosis only
  - Meiosis I and mitosis
  - Meiosis II and mitosis
- Blast cells are:-
  - Precursors of mature cells
  - Transformed cells
  - Cells that blast
  - Enucleated cells
- The (OH<sup>-</sup>) concentration of 0.01N HCL solution is:-
  - 1x10<sup>-8</sup>g mol per litre
  - 1x10<sup>-10</sup>g mol per litre
  - 1x10<sup>-12</sup>g mol per litre
  - 1x10<sup>-14</sup>g mol per litre
- The sites of oxygen evolution and photophosphorylation in chloroplast are:-
  - Grana stacks
  - Matrix
  - Inner wall of chloroplast
  - Surface of chloroplast
- Galactosemia is due to the deficiency of
  - Glucose-6-phosphatase
  - Phosphogalactose uridyl transferase
  - Glucokinase
  - Phosphoglucomutase
- Which one of the following inhibits the release of insulin from β cells of islets of langerhans?
  - Hyperglycemia
  - Elevated levels of norepinephrine
  - Elevated levels of arginine
  - Elevated levels of Glucagon
- Deficiency in the secretion of hormone from the thyroid gland leads to:
  - Sluggishness and Growth retardation
  - High blood pressure
  - Delayed development of secondary sex characteristics
  - Defective carbohydrate metabolism
- A bacterial cell wall does all of the following except
  - Gives shape and rigidity to the cell
  - is the site of action for some antibiotics
  - is associated with some symptoms of disease
  - Protects the cell from phagocytosis
- A slippery outer covering in some bacteria that protects them from phagocytosis by host cells is
  - Cell wall
  - Capsule
  - Flagellum
  - Peptidoglycan
- Which of the following contains polysaccharide?
  - Plasmids
  - Pili
  - Flagella
  - Gram negative cell wall
- Flagella and pili are made of
  - Lipids
  - Carbohydrates
  - RNA
  - Protein
- When flagella are located around the entire bacterial cell, the arrangement is called
  - Polar
  - Random
  - Bipolar
  - Peritrichous

13. An encapsulated cell will reproduce to form colonies that appear  
 a) Nonpathogenic      b) Translucent      c) Pink      d) Smooth
14. Energy is stored in the ATP (adenosine triphosphate) molecule in its  
 a) Sugar portion      b) Adenine portion  
 c) Third phosphate bond      d) none of the above
15. Organisms that ferment glucose may produce any of the following end products except  
 a) Lactic acid      b) Propionic acid      c) Alcohol      d) Oxygen
16. Outer membrane proteins are present in:-  
 a) Gram -positive bacteria      b) Gram - negative bacteria  
 c) Mycoplasma membranes      d) Tonoplast membranes
17. The bacterial envelope includes all of the following structures except -  
 a) Capsule      b) Cell wall      c) Cell membrane      d) Endospore
18. 9+2 fibrillar arrangement is present in  
 a) Bacterial flagella      b) Bacterial fimbriae  
 c) Eukaryotic flagella      d) T4 bacteriophage
19. Tissue engineering involves utilization of  
 a) Mesenchymal stem cells      b) Biomaterials  
 c) Growth factors      d) All the above
20. Nanomaterials can be used in  
 a) Tissue engineering      b) Cancer cell imaging  
 c) Controlled drug delivery      d) All the above
21. Bone marrow can give rise to  
 a) Mesenchymal stem cells      b) Embryonic stem cells  
 c) Totipotent stem cells      d) bacterial stem cells
22. Nucleosome contains  
 a) DNA      b) histones  
 c) DNA and histones      d) non histones
23. Gene silencing can be obtained by  
 a) siRNA      b) micro RNA      c) antisense RNA      d) all the above
24. DNA is transcribed by RNA polymerase into  
 a) RNA      b) Protein      c) DNA      d) Gene
25. The enzyme involved in RNA transcription is  
 a) RNA polymerase X      b) RNA polymerase II  
 c) RNA polymerase V      d) DNA polymerase
26. Gene expression can be altered by  
 a) Knock out      b) Knock in  
 c) Over expression      d) All the above

27. The transduction means introducing DNA into mammalian cells by  
 a) Lipids                      b) Virus                      c) Polymers                      d) Plasmid
28. mRNA may have  
 a) poly (T) tail                      b) poly (G) tail  
 c) poly a tail                      d) amino acid
29. RNA can be degraded by  
 a) DNase                      b) RNase                      c) Proteinase                      d) Protease
30. RNA splicing involves removal of  
 a) Exons                      b) Introns                      c) Promoters                      d) DNA
31. A sensitive method to quantify expression of mRNAs is  
 a) Real time RT-PCR                      b) Western blot  
 c) Northern blot                      d) Southern blot
32. Proteins can be separated and identified by  
 a) Northern blot                      b) Western blot  
 c) Southern blot                      d) North southern
33. Protein phosphorylation is mediated by  
 a) Kinases                      b) Phosphatases                      c) Proteases                      d) Phospholipases
34. A DNA strand has the sequence A-C-A-G-C-C-G-T-A. What would be its complementary strand?  
 a) T-G-T-C-G-G-C-A-T                      b) A-C-A-G-C-C-G-T-A  
 c) U-G-U-C-G-G-C-A-U                      d) G-T-G-A-T-T-A-C-G
35. A nucleoside consists of:  
 a) A pentose sugar and a nitrogeneous heterocyclic base.  
 b) A pentose sugar and a oxygen base.  
 c) A hexose sugar and a nitrogeneous heterocyclic base.  
 d) A phosphate group, a pentose sugar and a nitrogeneous heterocyclic base.
36. The number of hydrogen bonds that hold the Adenine - Thymine base pair together is  
 a) 2                      b) 3                      c) 4                      d) 5.5
37. The DNA molecules of different species differ in their:  
 a) Phosphate backbone                      b) Sequence of bases  
 c) Type of nucleotides                      d) lipid content
38. Because one original strand of the double stranded DNA helix is found in each daughter cell (after cell division), the DNA replication process is:  
 a) Semiconservative                      b) Conservative  
 c) Derivative                      d) Dispersive
39. When tryptophan is present in the medium, the transcription of tryptophan producing genes in E. coli is stopped by a helix-turn-helix regulator binding to the  
 a) trp operator                      b) trp repressor  
 c) trp polymerase                      d) trp promoter

40. In order for a gene to be transcribed, RNA polymerase must have access to the DNA helix and be able to bind to the genes  
 a) Activator                      b) Regulator                      c) Promoter                      d) Repressor
41. The most common form of gene expression regulation in both bacteria and eukaryotes is  
 a) Translational control                      b) Transcriptional control  
 c) Post-transcriptional control                      d) Control of passage from the nucleus
42. *E. coli* is able to use foods other than glucose in the absence of available glucose, because falling levels of glucose cause an increase of  
 a) cAMP                      b) Maltose                      c) Glu operons                      d) tRNA
43. Which of the following is part of an operon?  
 a) Structural genes                      b) a CAP binding site  
 c) An operator                      d) All the above
44. If the uracil content is exhausted, the following process will immediately stop:  
 a) Reverse transcription                      b) Transcription  
 c) Replication                      d) Translation
45. Shine-Dalgarno sequence is:  
 a) Found at the 3' end of a prokaryotic gene  
 b) Found in 16S rRNA  
 c) Complementary to an mRNA sequence  
 d) Located upstream of the AUG initiation codon of a prokaryotic mRNA
46. The enzyme catalyzing the binding of Alanine to its tRNA is called:  
 a) Alanine-tRNA polymerase                      b) Alanine-tRNA transferase  
 c) tRNA-Alanyl polymerase                      d) Alanyl-tRNA synthetase
47. The sequence of bases located prior to the gene (along the DNA strand), to which a complex of RNA polymerase and sigma factors attaches itself to initiate transcription is called:  
 a) Promotor                      b) Terminator                      c) Exon                      d) Activator
48. Which of the following is not part of RNA processing in eukaryotes?  
 a) Addition of 5' cap                      b) RNA splicing  
 c) Addition of poly A tail                      d) Reverse transcription
49. In recombinant DNA technology, a selected gene is removed from an animal, plant, or microorganism, and is inserted into what?  
 a) A primer                      b) A palindrome                      c) A vector                      d) An organism
50. A method used to distinguish DNA of one individual from another is  
 a) Polymerase chain reaction  
 b) DNA replication  
 c) Reverse transcriptase  
 d) Restriction fragment length polymorphism.

51. Why are DNA polymerases from thermophilic organisms used in the polymerase chain reaction?
- Because they are required to keep the two strands separated
  - Because they cannot add new nucleotides at low temperatures
  - Because they are easier to isolate than psychrophilic DNA polymerases
  - Because the priming and extension steps must be carried out at high temperatures to prevent the single strands from reannealing
52. In the Sanger method of DNA sequencing, what causes the termination of chain elongation?
- The incorporation of a regular DNA nucleotide
  - Denaturation of the double-stranded test fragments
  - The incorporation of a dideoxynucleotide
  - When the DNA polymerase encounters a stop codon
53. The technique that utilizes probes to detect specific DNA sequences is known as what?
- Southern blot
  - Western blot
  - Eastern blot
  - Northwestern blot
54. The insertion of a cloning vector into a cloning host typically involves what process?
- Polymerase chain reaction
  - Transformation
  - Hybridization
  - Conjugation
55. Transgenic microorganisms have been used to improve or benefit all but which of the following?
- Meat yield
  - Medical diagnosis
  - Crop improvement
  - Bioremediation
56. Genetically identical organisms derived from a single genetic source are called
- Populations
  - Varieties
  - Sibling species
  - Clones
57. Which of the following is not an application of genetic engineering in plants?
- Nitrogen fixation
  - DNA vaccines
  - Resistance to glycolysis
  - Production of insecticidal proteins in plants
58. Why does the Environmental Protection Agency closely monitor the release of transgenic bacteria used for agricultural purposes?
- They want to monitor the destruction of crops by the GMOs.
  - They want to observe the effect the GMOs have on crops.
  - They want to ensure the GMOs do not proliferate in the environment and pose a threat to humans.
  - They want to ensure that people are aware that GMOs may have played a role in the production of a particular food product.
59. For an enzyme that displays Michaelis-Menten kinetics, the reaction velocity (as a fraction of  $V_{max}$ ) observed at  $[S] = 2, K_M$  will be
- 0.09
  - 0.33
  - 0.66
  - 0.91

60. The Monod-Wyman-Changeoux ("concerted") model for cooperativity cannot account for
- Heterotropic interactions
  - Negative cooperativity
  - Non-integral values of  $n_H$
  - Positive cooperativity in enzyme kinetics
61. Why is the Lineweaver-Burk plot important in enzyme kinetics?
- It reveals the presence of organic prosthetic groups in enzymes.
  - It is a single-reciprocal plot.
  - It makes it easier to determine  $V_{max}$ .
  - It illustrates enzyme specificity.
62. Enzyme activity may depend
- Salt concentration
  - Temperature
  - Types of buffer
  - all the above
63. When the medium contains more than one carbon source, the phenomenon is
- Balanced growth
  - Diauxic growth
  - Unbalanced growth
  - Uncontrolled growth
64. Which of the following procedures uses a photocell to measure absorbance of a culture to regulate the flow of culture media?
- Chemostat
  - Trubidostat
  - Hemostat
  - Petroff-Hausser chamber
65. An unstructured model assumes
- Fixed cell composition
  - Balanced growth
  - Pseudo balanced growth
  - Both A and B
66. Growth Modelling by multiple substrates is referred to as
- Cybernetic approach
  - Structured approach
  - Unstructured approach
  - Chemostat approach
67. For the Monod equation, which parameter is incorrectly identified?
- $\mu_{max}$  = maximum growth rate
  - $K_s$  = monod coefficient
  - $\mu$  = growth rate
  - S = substrate type
68. In the Michaelis-Menten kinetics, at  $2V = V_{max}$ , the relation between  $K_m$  and S is given by:
- $K_m = 2S$
  - $K_m = S/2$
  - $K_m = S/4$
  - $K_m = S$
69. Identify the right units for reaction rate constant from the given list:
- $\text{mol}^2 * \text{L}^{-2} * \text{sec}^{-1}$
  - $\text{L} * \text{mol}^{-2} * \text{sec}^{-1}$
  - $\text{L}^2 * \text{mol}^{-2} * \text{sec}^{-1}$
  - $\text{L}^2 * \text{sec} * \text{mol}^{-2}$



70. Which statement is true for an enzyme?
- Enhances the rate of the reaction and does not affect the equilibrium
  - Affects the equilibrium but does not affect the reaction rate.
  - Enhances the reaction rate, but also affects the equilibrium concentration of products and reactants.
  - Does not affect kinetics and thermodynamics of the reaction.
71. Which of the following cases are likely to lead to faster rates of catalysis by an enzyme immobilized on a negatively charged support?
- A positively charged substrate and a negatively charged product
  - A negatively charged substrate and a positively charged product
  - A positively charged substrate and a positively charged product
  - A negatively charged substrate and a negatively charged product
72. Which one of the following techniques is NOT ideal for immobilized cell free enzyme?
- Physical entrapment by encapsulation
  - Covalent surface bonding to surface carriers
  - Physical bonding to surface carriers
  - Covalent chemical bonding by cross-linking the precipitate
73. In fermentors, as the rate of aeration increases, the bubble size:
- Increases
  - Stays consistent
  - Becomes inconsistent
  - Decreases
74. The microbial death kinetics constant is given by the equation: ( $k_d$  is death kinetics rate constant and  $k_o$  is arrhenius constant, R is universal gas constant, T is absolute temperature and E is the activation energy)
- $k_d = k_o e^{E/RT}$
  - $k_o = k_d e^{-E/RT}$
  - $RT \ln \left( \frac{k_o}{k_d} \right) = -E$
  - None of the above
75. Which of the following is essential in an industrial scale aerobic fermentation:
- Oxygen is supplied along with the media and there is no further requirement for oxygen
  - Mixing with an impeller is adequate to insure proper aeration
  - Heat needs to be provided to maintain the temperature
  - cooling is necessary to maintain temperature
76. The main function of the sparger in industrial scale fermentor is to:
- Introduce small air bubbles to help areate the medium
  - Add sterile nutrients
  - Aid the cooling of the fermentor
  - Introduce steam in the fermentor during sterilization
77. In secondary metabolism two distinct phase trophophase and idiophase refer respectively to:
- Growth and production phase
  - Early and late phases
  - Primary and secondary metabolism
  - Lag phase and log phase





**GIS (Section code 09)**

1. Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  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  $\lambda$ 
  - 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)  $\text{cosec } t$
  - c)  $\sec t$
  - d)  $\tan t$

11. The art and science of mapmaking is known as
  - a) Remote sensing
  - b) GIS
  - c) GPS
  - d) Cartography
  
12. The identification and analysis of phenomena on the Earth's surface by using devices borne aircraft / elevator is
  - a) Geological technique.
  - b) Geo-Physical technique.
  - c) Photogrammetry.
  - d) Geographical Information System.
  
13. Raster data is represented by
  - a) Line
  - b) Points
  - c) Polygons
  - d) Grids
  
14. Smallest unit of the picture is
  - a) Dcm
  - b) Pixel
  - c) Pictorial unit
  - d) Pascal
  
15. GCP stands for
  - a) Graphical control point
  - b) Ground control point
  - c) Geographical control point
  - d) None of the above
  
16. Which of the following is not GPS satellite constellation?
  - a) NAVSTAR
  - b) GLONASS
  - c) GALILEO
  - d) INSAT
  
17. In India, remote sensing data/images can be obtained from
  - a) National Remote Sensing Centre, Hyderabad
  - b) Indian Space Research Organization, Bangalore
  - c) Space Research Centre, Ahmadabad
  - d) Survey of India
  
18. From the following satellites which one is not a meteorological satellite ?
  - a) NOAA
  - b) INSAT
  - c) GOES
  - d) IKONS

19. Which of the following sensor is used for fire monitoring?
  - a) NOAA
  - b) AVHRR
  - c) MODIS
  - d) AEIFS
  
20. IRS is a
  - a) Aircraft
  - b) Sensor
  - c) Satellite
  - d) Launch Vehicle
  
21. RADAR stands for
  - a) Radio Audio Development and Research
  - b) Regional Application for Data Analysis and Research
  - c) Radio Detection And Ranging
  - d) Radio Detection And Receiver
  
22. Which of the following spatial resolution images will show more detail?
  - a) 15.m
  - b) 5.8m
  - c) 23.5m
  - d) 0.61m
  
23. ISRO stands for
  - a) International Science Research Organization
  - b) International Space Research Organization
  - c) Indian Space Research Organization
  - d) Indian Science Research Organization
  
24. Cartosat-1 is
  - a) Indian satellite
  - b) US satellite
  - c) Japan satellite
  - d) Russian satellite
  
25. The distance can be measured indirectly using distance measured instruments called
  - a) Tachometer.
  - b) Theodolite.
  - c) EDM.
  - d) Clinometer's.
  
26. The art of obtaining information about an object on earth surfaces without being in physical contact is known as
  - a) Photogrammetry
  - b) Optics
  - c) Remote sensing
  - d) Satellite Imaging
  
27. Airborne platform is
  - a) Balloon
  - b) Satellite
  - c) Aircraft
  - d) both a and c

28. The Photographs used in Photogrammetry are
- Aerial Photos and Terrestrial Photos
  - Color photos
  - B&W photos
  - Color and B& W Photos
29. Application of Photogrammetry particularly in urban management is
- Road Alignment
  - Height of the building
  - Delineation of boundary of buildings
  - All the above
30. Stereo pair Images are generated by
- Overlapping two Images
  - Non-Overlapping two Images
  - Over-lapping 3-Images
  - Overlapping 4 images
31. The degree of tilt in a tilted photograph is
- 1° to 3°
  - 1° to 7°
  - 1° to 6°
  - 1° to 5°
32. -----controls the amount of light entering the photographic camera
- Lens
  - Shutter
  - Aperture
  - Diaphragm
33. The aerial Photogrammetry used for Non-Engineering applications like
- Soil Maps of Geological
  - Tax Maps of Forest map
  - Astronomy of Archaeology map
  - All the above
34. Energy incidence is equal to
- Reflection + Absorption + Transmission
  - Reflection only
  - Reflection + Emission
  - Emission + absorption
35. The point on the ground coinciding with the optical axis of the camera is known as
- Principle point
  - Fiducial point
  - Nadir
  - Floating mark
36. Orthophotos are
- Photographs without distortions
  - Photographs with distortions
  - Photographs with relief displacement
  - Photographs with tilt

37. Ground control points in Photogrammetry used for
- Interior orientation
  - Exterior orientation
  - Absolute orientation
  - Relative orientation
38. Scale is defined as ratio between
- Distance on ground by distance on MAP
  - Distance on Map by Distance on ground
  - Distance on the ground and airways
  - None of the above
39. Relief displacement is defined as
- Change in Height
  - Change Shape
  - Change in Size
  - All
40. Uses of Stereoscope are
- Elimination of Parallax
  - Getting 3D-view
  - Exact Projection of Height visualized
  - Getting elevation
41. Titled photograph requires
- Geometric Correction
  - Linear Correction
  - Angular Correction
  - All
42. In a photo theodolite, the camera is
- Below the telescope.
  - Above the telescope.
  - Below and above telescope
  - Attached with any one of the telescope side
43. The system for referring locations on the earth is known as
- Bench mark
  - MSL / Datum
  - X, Y & Z co-ordinates
  - All the above
44. In remote sensing the Black & White images are called
- Panchromatic
  - Multi-spectral
  - Digital
  - Spectral
45. The arrangement of electromagnetic energy according to wavelength or frequency is known as
- Electronic spectrum
  - Magnetic spectrum
  - Electromagnetic spectrum



- d) Electronic distance measurement
46. The wave length range of visible region in EMR is  
a) 0.4 to 0.7  $\mu\text{m}$ .  
b) 1mm to 300 mm.  
c) 0.03 to 0.04 m.  
d) 0.01m to 0.07 m.
47. The wave theory of light was proposed by  
a) Newton.  
b) Huygens.  
c) Maxwell.  
d) All of the above.
48. Remote Sensing major components are.  
a) Sensor / Camera  
b) EMR  
c) Satellite / Platform  
d) All the above
49. The relationship between Wavelength and wave frequency is  
a) Wave length = wave frequency  
b) Wave length = (1/ wave frequency)  
c) Wave length = 2 wave frequency  
d) Wave length = 3 wave frequency
50. 1:50,000 in topographic map means  
a) 1cm on the map equals to 5000 cm on ground  
b) 1cm on the map equals to 5000 m on ground  
c) 1cm on the map equals to 500 m on ground  
d) 1cm on the map equals to 50,000 cm on ground
51. Plants appear green in color because of high -----of green wavelength  
a) Refraction  
b) Reflection  
c) Absorption  
d) Transmittance
52. Which of the following wavelength band is absorbed by Chlorophyll present in the leaf?  
a) Red and Green  
b) Red and Blue  
c) Blue and Green  
d) Red and Blue
53. 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
54. Energy is transmitted through space matter by means of  
a) Electromagnetic waves.

- b) Light waves.
  - c) Sound waves.
  - d) Sea waves.
55. The number of wave cycles completed with respect to time is called
- a) Wave length.
  - b) Cycle.
  - c) Frequency.
  - d) Velocity.
56. The Infrared wave is classified into
- a) NIR, MIR & FIR
  - b) NIR, FIR, TIR & FIR
  - c) TIR & FIR
  - d) NIR & FIR
57. The region of atmosphere through which the electromagnetic radiations passes without attenuation
- a) Atmospheric influences
  - b) Atmospheric doors
  - c) Atmospheric widows
  - d) Atmospheric greenhouse
58. \_\_\_\_\_ is the type of EDM instruments, which are used for measure the distance electronically.
- a) GPS.
  - b) Clinometers.
  - c) Compass.
  - d) Total station
59. Latitude, Longitude and Elevation on the earth surface are measured by
- a) Aerial camera.
  - b) Compass.
  - c) GPS.
  - d) Digital Camera.
60. Remote sensing technique is expansive, because
- a) if apply in small areas
  - b) Processing software is costly
  - c) Large scale map cannot be prepared
  - d) All the above
61. The data acquired by the remote sensing system are recorded on
- a) CCD.
  - b) Floppy.
  - c) CD-Rom.
  - d) Film.
62. Name of the secondary storage device in the computer system
- a) Hard-disk.
  - b) Floppy.
  - c) CD or Compact-Disk.
  - d) All the above.

63. SQL refers to
- Structured Query Language.
  - System Query Language.
  - Synthesis Query Language.
  - None of these.
64. DDBMS refers to
- Distributed Database Management System
  - Delayed Database Management System
  - Devoted Database Management System
  - Decorated Database Management System
65. In database the primary key is called.
- Unique type of key
  - Two different types of key
  - Multiple number of key
  - All the above.
66. GUI refers to
- Geological Union Interface.
  - Geological User Interface.
  - Geographical user Interface.
  - Graphical user Interface.
67. \_\_\_\_\_ is the programming software used for management of DBMS
- Visual Basic
  - Oracle.
  - SQL.
  - All the above.
68. In a student database the "student\_name" is a type of
- Attribute data
  - Spatial data
  - Vector data
  - Measurable data
69. 1 byte=?.
- 1.6 bit.
  - 8 bit.
  - 32 bit.
  - 128 bit.
70. In Database management system DML refers to
- Data Manipulation Language
  - Data Multiplication Language
  - Data Monitoring Language
  - Data Mutual Language
71. Server Principles involve
- Connecting all the clients
  - Distributing software to all the clients
  - Connecting all the clients to the printer
  - All the above.

72. A database having one in many relationship – is called
- Hierarchal
  - Relational
  - Network
  - All the above
73. ROM refers to
- Random Only Memory.
  - Read Only Memory.
  - Relay Only Memory.
  - All the above.
74. RDBMS refers to
- Regional Database Management System.
  - Random Database Management System.
  - Relational Database management System.
  - Resources Database Management System
75. \_\_\_\_\_ will be indicating the speed of the computer
- ROM
  - RAM
  - Hard Disk
  - All the above.
76. LCD meant by,
- Liquid Crystal Display.
  - Light Crystal Display.
  - Light Common Display.
  - Liquid Color Display.
77. Watershed management is.
- To conserve the water
  - To increase groundwater potential
  - To minimize the soil loss
  - All the above
78. Soil Erosion by raindrops is called
- Rill erosion
  - Inter -rill erosion
  - Splash erosion
  - Sheet erosion
79. The ground surface is highly means with irregular elevation and depressions, shapes, plains are called.
- Topography.
  - Geography.
  - Geology.
  - Land forms.
80. Marble is a type of
- Volcanic rock
  - Plutonic rock
  - Sedimentary rock

- d) Metamorphic rock
81. Evaporation is measured by
- Water level indicator
  - Pan-Evaporimeter
  - Iso-heights
  - Water meter
82. Kharif season falls on
- Jan-May.
  - Oct-April.
  - June-Sept.
  - March-October.
83. The Hydrological components are
- Precipitation
  - Evaporation
  - Infiltration
  - All the above
84. Hydrograph is related to
- Rainfall vs Time.
  - Rainfall vs Runoff.
  - Runoff vs Time.
  - All the above.
85. Overdraft of ground water in coastal region leads
- Aquifer depletion
  - Saline water intrusion
  - No change in the aquifer
  - a and b
86. Detachment of soil particles due to action of wind and water is called
- Soil Erosion
  - Soil Sedimentation
  - Siltation
  - Soil dehydration
87. Rainfall measured by the instruments of
- Rainfall collector
  - Rainfall meter
  - Rain-gauge.
  - Rainfall pan
88. Which of the following materials has the least porosity?
- Clay
  - Silt.
  - Sand
  - Gravel
89. Catchments of water bodies located in
- Down-stream side
  - Up-stream side

- c) Both includes up and down stream sides
  - d) Part of the down-stream side
90. It is a slow or sudden downhill movement of slope forming surface materials under the force of gravity.
- a) Earth Quake
  - b) Tsunami
  - c) Land Slide
  - d) All the above
91. Contours are drawn by
- a) Joining rain gauge station locations
  - b) Drawing equal angles
  - c) Drawing lines of equal elevations.
  - d) Drawing lines of equal precipitation depth for a given numbers.
92. Infiltration is measured by.
- a) Double ring infiltrometer.
  - b) Lysimeter
  - c) Filtration techniques
  - d) Single ring infiltrometer
93. \_\_\_\_\_ is the process of water convert from liquid state to vapour state
- a) Evaporation
  - b) Transpiration
  - c) Evapotranspiration
  - d) Rainfall
94. The potential ability of groundwater depends on
- a) Aquifer condition
  - b) Soil porosity
  - c) Soil permeability
  - d) All the above
95. The average rainfall can be estimated from number of rain-gauges stations by
- a) Thiessen polygon method
  - b) Arithmetic mean method
  - c) Isohyets method
  - d) All the above
96. An aquifer which is located in between impervious layer is called
- a) Unconfined aquifer
  - b) Confined aquifer
  - c) Semi-Confined aquifer
  - d) Semi unconfined aquifer
97. The Rainfall starts to surface runoff at the condition of.
- a) Soil saturation capacity
  - b) Soil Field capacity
  - c) Soil bearing capacity
  - d) Soil wilting point

98. In agriculture the remote sensing technique can be applied for
- a) Yield forecasting
  - b) Crop differentiation
  - c) Crop condition
  - d) All the above
99. Wind erosion is caused by
- a) Storms of high intensity
  - b) Mismanagement of land resources
  - c) Type of soil
  - d) All the above
100. The advanced and final stage of soil erosion by flow of runoff water is called
- a) Rill erosion
  - b) Inter -rill erosion
  - c) Splash erosion
  - d) Gully erosion

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**Environmental (Section code 10)**

1. Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  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  $\lambda$   
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)  $\text{cosec } t$                                       c)  $\sec t$                                       d)  $\tan t$



11. The following factors are key drivers of globalization,
- Government action, exchange rates, competition and sociodemographic factors
  - Market convergence, competition, exchange rates and cost advantages.
  - Cost advantages, government action, economic cycles and competition.
  - Market, cost, competition and government policies.
12. The 1987 Montreal Protocol was signed for which of the following reasons?
- To phase out the use of CFC's, found to be causing depletion of the ozone layer
  - To ban nuclear testing in tropical oceans
  - To begin converting from fossil fuel use to more renewable energy sources to reduce the anthropogenic greenhouse effect
  - To stop the global trade in products made from endangered tigers
13. Approximately what proportion of the global land surface is used for agriculture and grazing by the world's 6 billion people?
- |                  |                   |
|------------------|-------------------|
| a) One eightieth | b) Three quarters |
| c) One third     | d) One tenth      |
14. Which of the following is *not* a major positive feedback mechanism in which the activity of humans to increase global climate temperatures leads to an even further increase?
- Global warming causes increased CO<sub>2</sub> release from biomass decomposition
  - Global warming causes snow to melt in polar regions and therefore increases global albedo
  - Global warming causes increased rainfall, plant growth and photosynthesis
  - Tropical deforestation causes warming and drying so that remaining forests begin to decline
15. What is the primary reason for targeting 'biodiversity hotspots' for conservation?
- The number of species threatened far exceeds our capacity to protect them and we can therefore only concentrate on areas of highest species diversity
  - To protect all areas of threatened species would not allow for new species to develop
  - They are the only areas where species are seriously threatened in the world
  - They are areas where people do not live and conservation would therefore not be effecting the economic development of the area
16. Which of the following is *not* one of the prime health risks associated with greater UV radiation through the atmosphere due to depletion of stratospheric ozone?
- |                          |                           |
|--------------------------|---------------------------|
| a) Increased skin cancer | b) Reduced immune system  |
| c) Damage to eyes        | d) Increased liver cancer |
17. What is the harm from the depletion of Earth's ozone layer ?
- The average temperature of earth's surface will increase gradually
  - The oxygen content of the atmosphere will decrease
  - Increased amount of Ultra violet radiation will reach earth's surface
  - Sea levels will rise as the polar ice caps will gradually melt
18. Acid rain is formed due to contribution from the following pair of gases
- |                                |                                       |
|--------------------------------|---------------------------------------|
| a) Methane and ozone           | b) Oxygen and nitrous oxide           |
| c) methane and sulpher dioxide | d) Carbon dioxide and sulpher dioxide |

19. The most serious environmental effect posed by hazardous wastes is
- air pollution.
  - contamination of groundwater.
  - increased use of land for landfills.
  - destruction of habitat.
20. A major in-stream use of water is for
- producing hydroelectric power.
  - dissolving industrial wastes.
  - agricultural irrigation.
  - domestic use.
21. Which of the following are the example of Municipal and industrial discharge pipes ?
- nonpoint sources of pollution.
  - violations of the Clean Water Act.
  - point sources of pollution.
  - irrigation.
22. The presence of high coliform counts in water indicates
- contamination by human wastes.
  - phosphorus contamination.
  - decreased biological oxygen demand.
  - hydrocarbon contamination.
23. How the biological oxygen demand gets affected with the increased presence of organic matter in water?
- the oxygen demand increases
  - the oxygen demand decreases
  - the oxygen demand remains unchanged
  - None of the above
24. The stage in which the biological processes is used to purify water in a wastewater treatment plants is called
- secondary sewage treatment
  - primary sewage treatment
  - wastewater reduction
  - biochemical reduction
25. Groundwater mining in coastal areas can result into
- increase in the salinity of groundwater.
  - decrease in the toxicity of groundwater.
  - decrease in the salinity of groundwater.
  - increase in the water table.
26. The three primary soil macronutrients are
- carbon, oxygen, and water.
  - copper, cadmium, and carbon.
  - potassium, phosphorus, and nitrogen.
  - boron, zinc, and manganese.
27. Which of the following is not a major source of groundwater contamination?
- agricultural products
  - landfills
  - septic tanks
  - all of the above are major sources of groundwater contamination
28. The area of sociology that covers the size, composition, and distribution of populations is called \_\_\_\_\_.
- demography
  - anthropology
  - geography
  - environmental sociology

29. All the populations of plants and animal species that live and interact in a given area at a particular time, as well as the chemical and physical factors that make up the non-living environment are called a[n] \_\_\_\_\_.
- a) environmental microcosm                      b) symbiotic world order  
c) socio-economic system                      d) ecosystem
30. Removing natural resources from the environment and adding to environmental problems through pollution are major factors in a process called \_\_\_\_\_.
- a) the biotechnological revolution              b) environmental degradation  
c) the green revolution                          d) the greenhouse effect
31. Valuable, practical services that help to preserve ecosystems performed by nature are called \_\_\_\_\_.
- a) the greenhouse effect                          b) ecosystem services  
c) biosphere balancing                          d) biosphere balancing
32. The two compounds that acid rain contains that are most damaging to the environment are \_\_\_\_\_ and \_\_\_\_\_.
- a) nitrogen; water                                  b) sulfuric acid; nitric acid  
c) carbon dioxide; sulfuric acid              d) carbon dioxide; water
33. The device on an automobile that filters harmful pollutants out of the exhaust before it enters the air is a[n] \_\_\_\_\_.
- a) carburetor                                          b) alternator  
c) catalytic converter                              d) radiator
34. The only gas in the atmosphere that can absorb the sun's dangerous ultraviolet radiation is \_\_\_\_\_.
- a) nitrous oxide                                      b) carbon dioxide  
c) nitrogen                                              d) ozone
35. Approximately 70 percent of the earth is covered by water. Of this amount, approximately \_\_\_\_\_ percent of it is suitable for human use.
- a) less than                      b) 10                      c) 20                      d) 15
36. The largest amount of usable water found on earth is used for \_\_\_\_\_.
- a) recreation                      b) crop irrigation                      c) household use                      d) industrial uses.
37. Societies that throw away large quantities of paper, plastic, metal and other materials are called \_\_\_\_\_.
- a) recycling societies                              b) toxic societies  
c) disposable societies                              d) post industrial societies
38. The part of geography that embodies map making is known as \_\_\_\_\_.
- a) theodesy                      b) geodesy                      c) calligraphy                      d) cartography
39. A map scale of 1:15,000 means that \_\_\_\_\_.
- a) one centimeter on the map equals 15,000 centimeters on the ground  
b) one foot on the map equals 15,000 feet on the earth  
c) one inch on the map equals 15,000 inches on the ground  
d) all of the above

40. In a reversible adiabatic change  $\Delta S$  is  
 a) infinity  
 b) zero  
 c) equal to  $C_v dT$   
 d) equal to  $nR \ln V_2/V_1$
41. At constant temperature and pressure which one of the following statements is correct for the reaction?  
 $CO(g) + 1/2O_2(g) \rightarrow CO_2(g)$   
 a)  $\Delta H = \Delta E$   
 b)  $\Delta H < \Delta E$   
 c)  $\Delta H > \Delta E$   
 d)  $\Delta H$  is independent physical state of reactant
42. Air Pollution, Prevention and Control Act was enacted in India during the year,  
 a) 1981  
 b) 1982  
 c) 1983  
 d) 1984
43. Permissible Fluorides limit in water as per I.S is  
 a) 1 ppm  
 b) 1.5 ppm  
 c) 2.0 ppm  
 d) 2.5 ppm
44. What does 1mm on a map drawn at scale of 1 in 20000 represent in the ground?  
 a) 20m  
 b) 50m  
 c) 75m  
 d) 100m
45. Ten watts is equal to  
 a) 10 N/m  
 b) 10 Nm/s  
 c) 10 Nm/h  
 d) 10 Nm
46. 5ppm is also expressed in/as  
 a) 5 grams per Litre  
 b) 5 milligrams per Litre  
 c) 5 kilograms per Litre  
 d) 5 grams per gallon
47. Which of the following are key application disciplines for GIS?  
 a) Civil Engineering  
 b) Mechanical Engineering  
 c) Biology  
 d) Physics and Chemistry
48. An anthropocentric world view as one cause of environmental problems is most aligned with which of the following perspectives?  
 a) conflict perspective  
 b) structuralist perspective  
 c) functionalist perspective  
 d) symbolic interactionism
49. What did Chernobyl, Three Mile Island, the Love Canal, and Bhopal, India all have in common?  
 a) They were all nuclear disasters.  
 b) They qualified as technological disasters.  
 c) They all involved environmental racism.  
 d) They were environmental problems caused by economic development.
50. The two early conflict theorists who refuted the Malthusian Theory because they recognized that farming could match the food supply needs were \_\_\_\_\_ and \_\_\_\_\_.  
 a) Auguste Comte; Henri Saint Simon  
 b) Karl Marx; Friedrich Engels  
 c) Robert Merton; Michael Burawoy  
 d) Edwin Sutherland; Donald Cressey







90. 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
91. Which of the following is not related to solid waste management?  
 a) Reuse                      b) Recycle                      c) Recovery                      d) Resettlement
92. Why is sediment yield an important consideration in a discussion of water supplies?  
 a) sediment yield affects the amount of water that is available  
 b) water resources and sediment resources are closely intertwined  
 c) sediment is a common water pollutant  
 d) soil erosion restricts water flow to streams
93. The boundary between drainage basins is called the  
 a) watershed                      b) high point                      c) basin split                      d) drainage divide
94. The drainage density on clay soils is likely to have what relationship to the drainage density on gravel soils?  
 a) greater drainage density on clay soils  
 b) greater drainage density on gravel soils  
 c) equal drainage density, the soil type has no effect  
 d) greater drainage density on clay soils, but with fewer streams
95. Runoff depends on any one of the following factors  
 a) Soil                      b) Land Use                      c) Slope                      d) All the above
96. Carbogen is a mixture of  
 a) CO<sub>2</sub> and O<sub>2</sub>                      b) CO and O<sub>2</sub>                      c) Cl<sub>2</sub> and O<sub>2</sub>                      d) He and O<sub>2</sub>
97. Which one has the lowest world wide energy consumption?  
 a) Coal                      b) Oil                      c) Nuclear                      d) Natural gas
98. 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
99. The desirable limit for Total Dissolved Solids in water as per I.S is  
 a) 500ppm                      b) 800ppm                      c) 1000ppm                      d) 1200ppm
100. What is meant by MPN?  
 a) Mass Processing Number                      b) Most Probable Number  
 c) Most Processing Number                      d) Mass Probable Number

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### Food Processing (Section code 11)

1. In ball mill, the speed at which there will be centrifugation
  - a) Operating speed
  - b) Critical speed
  - c) Normal speed
  - d) Centrifugation speed
  
2. ----- solids are unfloatable
  - a) Hydrophilic
  - b) Hydrophobic
  - c) Both
  - d) Hygroscopic
  
3. The separation of solids from suspension in liquid by gravity alone is called
  - a) Centrifugation
  - b) Flocculation
  - c) Sedimentation
  - d) Filtration
  
4. Fluid consist of
  - a) Liquids
  - b) Gases
  - c) Vapours
  - d) Both liquids and solids
  
5. The viscosity of ----- increases with temperature
  - a) Syrup
  - b) Hydrogen
  - c) Water
  - d) Milk
  
6. Tomato ketchup is good example of
  - a) Newtonian fluid
  - b) Non- Newtonian fluid
  - c) Pseudoplastic
  - d) Both a) and b) are correct
  
7. Unit of viscosity is
  - a) Pascal
  - b) Pascal second
  - c) Pascal meter
  - d) Pascal kilogram
  
8. Cutting of food material into cubes is
  - a) Slicing
  - b) Milling
  - c) Dicing
  - d) Crystallization

9. Heating of food in an electrically insulating material by the losses in it when subjected to an alternating electric field is called
  - a) Plate heating
  - b) Dielectric heating
  - c) Microwave heating
  - d) Oven heating
  
10. Cold sterilization is
  - a) Sterilization by liquid nitrogen
  - b) Sterilization by ice
  - c) Sterilization by irradiation
  - d) Sterilization followed by freezing
  
11. The second law of thermodynamics states that
  - a) The energy change of a system undergoing any reversible process is zero
  - b) It is not possible to transfer heat from a lower temperature to higher temperature
  - c) The total energy of the system and surroundings remains constant
  - d) There will not be any energy change
  
12. Heat transfer occurs by natural convection because change in temperature causes difference in
  - a) Viscosity
  - b) Thermal conductivity
  - c) Heat capacity
  - d) Density
  
13. The most widely used coagulant for removing suspended impurities from water is
  - a) Alum
  - b) Bleaching powder
  - c) Chlorine
  - d) Calcium chloride
  
14. Which one of the following is not likely to be constituent of vegetable oil?
  - a) Oleic acid
  - b) Stearic acid
  - c) Citric acid
  - d) Glycerol
  
15. Entropy of a substance at 0 K temperature is its
  - a) Zero
  - b) Infinity
  - c) Very high but not infinity
  - d) Very low but not zero
  
16. First law of thermodynamics relates with the conversion of
  - a) Heat
  - b) Energy

- c) Momentum
  - d) Temperature
17. Compressor in a vapour compressor system is
    - a) Essential part
    - b) Optional part
    - c) There is a compressor in a compressor
    - d) Safety device
  18. Bacterial cells shows maximum resistance against the heat during
    - a) Logarithmic pahse
    - b) Lag pahse
    - c) Late lag phase
    - d) Decline phase
  19. Heat resistant mold present in canned fruits is
    - a) Clostridium botulinum
    - b) Bysoochlamys fulva
    - c) Penicillium notatum
    - d) Aspergillus niger
  20. Father of canning is
    - a) Nicholas Appert
    - b) Peter Durand
    - c) Louis Pasteur
    - d) Alexander Fleming
  21. Which of the following can be used for the preservation of breads and baked goods?
    - a) Nitrates
    - b) Propionates
    - c) Benzoates
    - d) Sugar
  22. Which of the following vitamins is / are affected by irradiation?
    - a) Vitamin B
    - b) Vitamin C
    - c) Vitamin B and C
    - d) Vitamin B1
  23. Storage of food under reduced pressure is called
    - a) Hypobaric packaging
    - b) Aseptic packaging
    - c) Hyperbaric packaging
    - d) Gas packaging
  24. In the preparation of sugar syrup, citric acid is added for
    - a) The prevention of the growth of mold
    - b) The inversion of sugar
    - c) The generation of fruity flavor
    - d) The removal of unwanted impurities present sugar.
  25. Boiling of water will lead to ..... of water
    - a) Sterilization
    - b) Pasteurization
    - c) Disinfection
    - d) Hydration

26. The time and temperature used for the pasteurization of milk is
- 72° C / 15 min
  - 72 °C / 15 sec
  - 72 °C / 30 min
  - 72 °C / 30 sec.
27. pH range of high acid food is
- 5.3 – 7
  - 6.5 – 7.8
  - 7 – 8.5
  - Below 3.7
28. Canned food should be stored in the
- Kitchen
  - Dry food store
  - Refrigerator
  - Deep freezer
29. In slow freezing
- Crystal size is big
  - Crystal size is small
  - Both extra cellular and intra cellular crystallization takes place
  - Quality of product is better than fast cooling
30. In dehydrofreezing, product to be frozen is first
- Blanched
  - Sterilized
  - Dehydrated
  - Pasteurized
31. Major source of antifreeze protein is
- Tuber
  - Spinach
  - Fish
  - Papaya
32. Nisin is a
- Narrow spectrum antibiotic
  - Wide spectrum antibiotic
  - Stabilizer
  - Nutrient supplement
33. Sorbic acid is mostly used as preservatives in which of the following food product?
- Meat
  - Milk
  - Baked product
  - Confectionary product
34. Which of the following is / are not biological antioxidant?
- Glucose oxidase
  - Peroxidase dimurtase
  - Glutathione peroxidase
  - Amylase
35. Hydrogen peroxide is used as the preservative in which of the following
- Milk
  - Meat

- c) Bread  
d) Confectionary
36. Which is found in carbonated non-alcoholic beverages?  
a) Propionic acid  
b) Acetic acid  
c) Citric acid  
d) Phosphoric acid
37. Which of the following compounds acts as both synergists and antioxidants?  
a) Ascorbic acid  
b) Citric acid  
c) Phosphoric acid  
d) Tartaric acid
38. .... compound present garlic have antimicrobial effect  
a) Allicin  
b) Allyl isothiocyanate  
c) Methyl sulphate  
d) Garlic acid
39. .... Protein is many fold sweeter than sucrose  
a) Casein  
b) Monelin  
c) Allicin  
d) Nisin
40. ----- salt of saccharine is mainly used as sweetner.  
a) Calcium  
b) Potassium  
c) Magnesium  
d) Sodium
41. Anticaking agents are  
a) Those used to destroy the cake while disposing the spoiled cakes  
b) Those used to maintain the free flowing nature of granular or powdered products.  
c) Those used to kill microorganisms growing in cakes  
d) Those used to maintain the shape of the cakes and pastries
42. Monosodium glutamate is mostly used as  
a) Artificial sweetner  
b) Anticaking agent  
c) Flavor enhancer  
d) Cleaning agent
43. Lemon extract can be preserved by using  
a) Alcohol  
b) Formaldehyde  
c) Acetic acid  
d) Formic acid
44. Vinegar is used as the preservative in  
a) Confectionary  
b) Ketchup  
c) Jelly  
d) Oils

45. Process which is responsible for the preservative nature of sugar is
- Osmosis
  - Reverse osmosis
  - Chelation
  - Toxicity
46. Baking powder is used in baking as
- Antimicrobial agent
  - Anticaking agent
  - Leavening agent
  - Stabilizing agent
47. One third of amino acids in gluten is
- Leucine
  - Lysine
  - Methionine
  - Glutamine
48. .... Of the following compound acts as antioxidant
- Malic acid
  - Pectin
  - Vitamin C
  - Amylase
49. Which of the following methods is generally employed to retain maximum flavor
- Low temperature vacuum processing
  - High temperature short time processing
  - Low temperature high time processing
  - High temperature vacuum processing
50. ----- fruit is climacteric
- Apple
  - Banana
  - Melon
  - All the above
51. Find out the reducing sugar
- Sucrose
  - Trehalose
  - Gluconate
  - Maltose
52. Non- enzymic browning reaction occurring between
- Phenolic compounds and PPO
  - Lipids and carbohydrates
  - Reducing sugars and amino acids
  - Lipids and proteins
53. Xanthan, the polysaccharide, stabilizing agent is derived from
- Fungus
  - Algae
  - Fern
  - Bacterium
54. Starch modification is done to
- Increase the cohesiveness of starch
  - Withstand the high temperature during processing

- c) Improve the gelling property of starch  
d) Make soft gel
55. High Fructose Corn Syrup, sweeter of soft drink comprised major portion of  
a) Ribose  
b) L-fructose  
c) D - fructose  
d) Mannose
56. Sulphur containing essential amino acids are  
a) Cysteine and methionine  
b) Tyrosine and phenylalanine  
c) Asparagine and tryptophan  
d) Proline and glutamine
57. Albumin fraction of protein is present in high concentration in  
a) Wheat  
b) Rice  
c) Gelatin  
d) Egg yolk and milk
58. The following is a non-protein amino acid  
a) Histamine  
b) Cysteine  
c) Alanine  
d) Tyrosine
59. Find out  $\omega$  - 3 fatty acid.  
a) Eicosa pentaenoic acid  
b) Oleic acid  
c) Linoleic acid  
d) Stearic acid
60. .... is dietary antioxidant widely used in fat and oil industries  
a) BHT (Butylated Hydroxy Toluene)  
b) BHA (Butylated Hydroxy Anisole)  
c) Tocopherol  
d) Tertiary Butyl Hydroquinone (TBHQ)
61. FFDCA stands for  
a) Food Flavour Development and Control Authority  
b) Food Flavourants and Drug Control Act  
c) Federal Food Drug and Cosmetic Act  
d) Federation of Food and Drug Control Agency
62. Rancidity is due to  
a) Lipolysis followed by the release of short chain fatty acids  
b) Hydrogenation of free fatty acids  
c) Interesterification  
d) Saponification which causes undesirable flavor
63. Racemization of protein can be done by  
a) Desulfuration  
b) Deamination  
c) Acid and /or alkaline hydrolysis  
d) Protein cross linking
64. Kunits and Bowman-Birk type inhibitors are  
a)  $\alpha$  - amylase inhibitors

- b) Invertase inhibitors
  - c) Phytate inhibitors
  - d) Protease inhibitors
65. Activated carbon is used in oil processing for
- a) Degumming
  - b) Waxing
  - c) Bleaching
  - d) Hydrogenation
66. Glycolysis is the name given to the following pathway involving the conversion of
- a) Glycogen to glucose - 6 - phosphate
  - b) Glycogen to glucose to pyruvate or acetyl CoA
  - c) Glycogen to pyruvate
  - d) Glucose to pyruvate or lactate
67.  $\alpha$  - amylases hydrolyses
- a)  $\alpha$  - 1-4 glycosidic bonds
  - b) Ester bonds
  - c) Peptide linkages
  - d)  $\beta$  - 1-4 glycosidic linkages
68. GM food is
- a) Gene modified food
  - b) Gene multiplied food
  - c) Genesis modified food
  - d) Genetically modified food
69. Enzyme that coagulate milk
- a) Rennet
  - b) Casein
  - c) Lactose
  - d) Catalase
70. Legumes are rich in ..... and -----amino acids
- a) Lysine and arginine
  - b) Cysteine and methionines
  - c) Phenylalanine and tyrosine
  - d) Glycine and glutamine
71. Dietary fiber is an indigestible ..... that serves separately as body regulatory agent
- a) Fat
  - b) Protein
  - c) Carbohydrate
  - d) Amino acid
72. .... is the body's primary source of energy
- a) Fructose
  - b) Glucose
  - c) Sucrose
  - d) Galactose
73. Less than ..... percent of Kcal should be from saturated fat
- a) 20
  - b) 35
  - c) 10



- d) 25
74. Which of the following pigments is present in a mature tomato?  
a) Chlorophyll  
b) Lycopene  
c) Bixin  
d) Anthocyanin
75. Inactivation of enzymes during blanching is due to prevent  
a) Loss of nutrient  
b) Loss of acidity  
c) Loss of pectin  
d) Browning reaction
76. Foaming nature of protein is  
a) Maximum at isoelectric pH  
b) Maximum at alkaline pH  
c) Maximum at acidic pH  
d) Maximum at neutral pH
77. Sourkraut is the  
a) Fermented radish  
b) Fermented carrot  
c) Fermented cabbage  
d) Fermented spinach
78. Wax coating of fruits is done to reduce  
a) Total soluble solids  
b) Rate of transpiration  
c) Surface glossy appearance  
d) Excess nutrients
79. The enzyme papain is obtained from  
a) Papaya  
b) Pine apple  
c) Pomegranate  
d) Pear
80. .... fruit is rich in lipids  
a) Mango  
b) Sweet orange  
c) Avocado  
d) Banana
81. ....aspects of milk decides its market price  
a) Fat content  
b) Iron  
c) Copper  
d) Solid contents
82. pH of the normal and fresh cow milk is  
a) 6.1  
b) 6.2  
c) 6.6  
d) 6.8
83. SNF content of buffalo milk is  
a) 9%  
b) 5%

- c) 7%
  - d) 13%
84. The only carbohydrate present in milk is
- a) Maltose
  - b) Lactose
  - c) Sucrose
  - d) Glucose
85. The father of white revolution is
- a) Dr. M. Kurien
  - b) Dr. V. Kurien
  - c) Dr. S. Kurien
  - d) Dr. A. Kurien
86. Cured meats are called as
- a) Beef
  - b) Ham
  - c) Marinades
  - d) Bacon
87. Poor quality of egg floats in the water due to
- a) Microbial spoilage
  - b) Increase in air cell
  - c) Decrease in air cell
  - d) Air cell has no relation to quality of egg.
88. Lard is obtained from
- a) Coconut
  - b) Hogs
  - c) Soybean
  - d) Beef
89. Which of the following is not a cereal?
- a) Wheat
  - b) Sugar cane
  - c) Barley
  - d) Maize
90. The soybean was first cultivated in
- a) Germany
  - b) USA
  - c) India
  - d) Chinas
91. The scientific name of wheat is
- a) Oryza sativa
  - b) Medicago sativa
  - c) Triticum aestivum
  - d) Zea mais
92. Cow's milk is deficient in
- a) Iron
  - b) Water
  - c) Calcium
  - d) Phosphorous
93. The major role of minor elements inside the organism is to play as
- a) Building block of important amino acids

- b) Constituent of hormones
  - c) Co -factor of enzyme
  - d) Binders of cell structure
94. Pellagra is due to low intake of
- a) Protein
  - b) Vitamin A
  - c) Niacin
  - d) Vitamin B<sub>12</sub>
95. .... vitamin is required for blood coagulation
- a) Vitamin K
  - b) Vitamin B<sub>12</sub>
  - c) Vitamin C
  - d) Vitamin E
96. World Food Day is celebrated on
- a) 15<sup>th</sup> March
  - b) 20<sup>th</sup> June
  - c) 25<sup>th</sup> September
  - d) 16<sup>th</sup> October
97. Amino acid limiting in cereals is
- a) Methionine
  - b) Lysine
  - c) Leucine
  - d) Tyrosine
98. The RDA of iron for lactating mother
- a) 30mg / day
  - b) 38mg / day
  - c) 28mg / day
  - d) 40mg / day
99. BMI can be abbreviated as -----
- a) Bone Material index
  - b) Bone Mass Index
  - c) Body Mass Index
  - d) Body Material Index
100. Trypsin enzyme pancreatic Fluid helps in the digestion of
- a) Protein
  - b) Carotene
  - c) Fat
  - d) Vitamins

\*\*\*\*\*

Materials Science (Section code 12)

- Find the work done by a constant force  $\vec{F} = 2\hat{i} + 4\hat{j}$ , 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
- 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)  $3xy^2 - y^3 + 5x + c$
- The particular integral of  $(D^2 - 4D + 3)y = \sin 3x$ , (where  $D \equiv \frac{d}{dx}$ ) 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)  $\frac{1}{30}(\cos 3x - \sin 3x)$
- 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
- if  $\vec{F} = (3x^2 - 3yz)\hat{i} + (3y^2 - 3zx)\hat{j} + (3z^2 - 3xy)\hat{k}$ , then  $\text{div}\vec{F}$  is  
a)  $6(x+y+z)$                       b)  $6(x-y-z)$                       c)  $3(x+y+z)$                       d)  $2(x+y+z)$
- If X is a poisson variate such that  $P(X=1) = \frac{3}{10}$  and  $P(X=2) = \frac{1}{5}$ , find  $\lambda$   
a)  $\frac{3}{4}$                       b)  $\frac{3}{2}$                       c)  $\frac{4}{3}$                       d)  $\frac{1}{4}$
- 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)  $\begin{pmatrix} -2 & -2 \\ 0 & -6 \end{pmatrix}$
- 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)  $\frac{\pi}{32}$
- 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)  $z = -1$
- If  $x = a(\cos t + t \sin t)$ ,  $y = a(\sin t - t \cos t)$ , find  $\frac{dy}{dx}$   
a)  $\cot t$                       b)  $\text{cosec } t$                       c)  $\sec t$                       d)  $\tan t$



22. A dielectric material has non-uniform polarization  $\vec{p}$ . The polarization volume charge density is given by  
 a)  $|\vec{p}|^2$                       b)  $\frac{|\rho|}{\epsilon}$                       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 valence 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)  $-\frac{E_g}{2K}$                       b)  $\frac{E_g}{2K}$                       c)  $\frac{E_g}{K}$                       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 its atom has  
 a) an incomplete valence 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  $H_c$  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









68. Molecules with only single bonds do not generally exhibit liquid-crystalline properties because \_\_\_\_\_.
- molecules without multiple bonds lack the rigidity necessary for alignment
  - molecules without multiple bonds are too small to exhibit liquid-crystalline properties
  - molecules with only single bonds are gases
  - molecules with only single bonds are too big to exhibit liquid-crystalline properties
69. Who photographed nanotubes for the first time ?
- Sumio Tijima
  - Tanigchi
  - Feynmann
  - Drexler
70. In a bucky ball, each carbon atom is bound to \_\_\_\_\_ adjacent carbon atoms.
- 1
  - 2
  - 3
  - 4
71. The size of red and white blood cells is in the range of \_\_\_\_\_  $\mu\text{m}$ .
- 2-5
  - 5-7
  - 7-10
  - 10-15
72. A healthy diet needs a balance of many things. Which is a main source of energy?
- fibre
  - carbohydrates
  - fat
  - vitamins
73. What is a mutation?
- a change in a gene or chromosome
  - a condition caused by a recessive allele
  - a process used in genetic engineering
  - a type of discontinuous variation
74. Which structure contains genes?
- the cell membrane of an animal cell
  - the cytoplasm of an animal cell
  - the nucleus of a plant cell
  - the vacuole of a plant cell
75. Of the following biological levels of organization, which represents the smallest or lowest level?
- organs
  - populations
  - cells
  - organisms
76. According to the fossil record, how many times has flight evolved among vertebrates?
- 1
  - 2
  - 3
  - 4
77. Which of the following pairs are analogous structures?
- the front leg of a horse and a human arm
  - the front leg of a frog and a bat wing
  - the wing of a bird and a bat wing
  - 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

