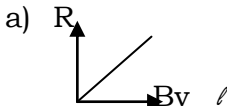
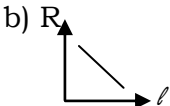
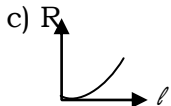
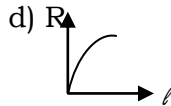


- The test is of 2 hours duration and consist of 180 questions. Each question carries 4 marks. For each correct response the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total score. The maximum marks are 720.
- Use Blue / Black ball point pen only for writing particulars on this page/ marking responses.
- Rough work is to be done on the paper provided.
- The candidates should ensure that the Answer Sheet is not folded. Do not make any stay marks on the Answer Sheet.
- Use of white fluid for correction is not permissible on the Answer Sheet.

- When a current flows in a conductor, the order of magnitude of drift velocity of electrons through it is _____.
 - 10^{-2} cm/s
 - 10^{-7} cm/s
 - 10^4 mm/s
 - 0.5 mm/s
- A conductor of certain resistance R is gradually elongated by applying a stretching force. Its resistance (R) versus length l graph will be _____.
 - 
 - 
 - 
 - 
- The ratio of kinetic energy to the total energy of an electron in a Bohr orbit of the hydrogen atom is _____.
 - 2:-1
 - 1:-1
 - 1:1
 - 1:-2
- What height from the surface of the earth the gravitation potential and the value of g are -5.4×10^7 JKg $^{-2}$ and 6ms^{-2} respectively? Take the radius of earth as 6400 km.
 - 1400 km
 - 2600 km
 - 1600 km
 - 2000 km
- Out of the following options which one can be used to produce a propagating electromagnetic wave?
 - A charge moving at constant velocity
 - A stationary charge
 - A chargeless particle
 - An accelerating charge
- The capacitance of parallel plate capacitor increase from $5 \mu\text{F}$ to $60 \mu\text{F}$. When a dielectric is filled between its plates. The dielectric constant of the dielectric is _____.
 - 65
 - 12
 - 55
 - 10
- Two small spheres each carrying 'q' placed 'r' metres apart repel each other with a force F. If one of the spheres is taken around the another one in a circular path of radius r, the work done will be _____.
 - $F \times r$
 - $F \times 2 \pi r$
 - $\frac{F}{2 \pi r}$
 - zero
- A refrigerator works between 4°C and 30°C . It is required to remove 600 calories of heat every second in order to keep the temperature of the refrigerated space constant. The power required is: (Take $1\text{cal}=4.2$ Joules)
 - 2.365W
 - 236.5 W
 - 23.65 W
 - 2365 W
- The efficiency of an ideal heat engine working between the freezing point and boiling point of water is _____.
 - 6.25%
 - 26.8%
 - 28%
 - 12.5%
- The mass of a lift is 2000kg. When the tension in the supporting cable is 28000N, then its acceleration is _____.
 - 30ms^{-2} downward
 - 4ms^{-2} upwards
 - 4ms^{-2} downwards
 - 14ms^{-2} upwards
- The elastic limit of brass is 3.5×10^{10} Nm $^{-2}$. Find the maximum load that can be applied to a brass wire of 0.75mm diameter without exceeding the elastic limit _____.
 - $4.12 \times 10^4\text{N}$
 - 5.15×10^4 N
 - 1.55×10^4 N
 - 0.55×10^4 N
- An air column, closed at one end and open at the other, resonates with a tuning fork when the smallest length of the column is 50cm. The next larger length of the column resonating with the same tuning fork is
 - 66.7 cm
 - 150 cm
 - 100 cm
 - 200 cm

13. A disk and a sphere of same radius but different masses roll off on two inclined planes of the same altitude and length. Which one of the two objects gets to the bottom of the plane first?
 a) Disk b) Sphere c) Both reach at the same time d) Depends on their masses
14. A bar magnet is hung by a thin cotton thread in a uniform horizontal magnetic field and is in equilibrium state. The energy required to rotate it by 60° is W . Now the torque required to keep the magnet in their new position is _____.
 a) $\frac{\sqrt{3}W}{2}$ b) $\frac{2W}{\sqrt{3}}$ c) $\frac{W}{\sqrt{3}}$ d) $\sqrt{3}W$
15. A carbon resistor of $(47 \pm 4.7)k\Omega$ is to be marked with rings of different colours for its identification. The colour code sequence will be _____.
 a) Yellow-Violet-Orange-Silver b) Yellow-Green-Violet-Gold
 c) Violet-Yellow-Orange-Silver d) Green-Orange-Violet-Gold
16. A uniform electric field E points along at x axis. If the potential at the origin is zero, then the potential at a point $(x, 0)$ will be _____.
 a) XE b) $2XE$ c) $-XE$ d) $\frac{-XE}{2}$
17. Which among the following will be the number of electrons in one coulomb of negative charge?
 a) $6.25 \times 10^{18}e$ b) $62.5 \times 10^{18}e$ c) $72.5 \times 10^{17}e$ d) $6.25 \times 10^{-18}e$
18. The angle of incidence for a ray of light at a refracting surface of a prism is 45° . The angle of prism is 60° . If the ray suffers minimum deviation through the prism, the angle of minimum deviation and refractive index material of the prism respectively are:
 a) $45^\circ, \frac{1}{\sqrt{2}}$ b) $30^\circ, \sqrt{2}$ c) $45^\circ, \sqrt{2}$ d) $30^\circ, \frac{1}{\sqrt{2}}$
19. In Young's double slit experiment the separation d between 2 slits is 2mm , the wavelength λ of the light used is 5896\AA and distance 'D' between the screen and slits is 100cm . It is found that the angular width of the fringes is 0.20° . To increase the fringe angular width is 0.21° . (with same λ and D) the separation between the slits needs to be changed to _____.
 a) 1.9mm b) 1.8mm c) 2.1mm d) 1.7mm
20. What is the minimum velocity with which a body of mass 'm' must enter a velocity loop of radius R so that it can complete the loop?
 a) \sqrt{gR} b) $\sqrt{2gR}$ c) $\sqrt{3gR}$ d) $\sqrt{5gR}$
21. A long wire carrying a steady current is bent into a circular loop of one turn. The magnetic field at the centre of the loop is B . It is then bent into a circular coil of 'n' turns. The magnetic field at the centre of this coil of 'n' turns will be _____.
 a) $2nB$ b) n^2B c) nB d) $2n^2B$
22. An electron is moving in a circular path under the influence of a transverse magnetic field of $3.57 \times 10^{-2}\text{T}$. If the value of e/m is $1.76 \times 10^{11} \text{ c/kg}$, the frequency of revolution of the electron is _____.
 a) 62.8 MHz b) 6.28 MHz c) 100 MHz d) 1 GHz
23. A person can see clearly objects only when they lie between 50cm and 400cm from his eyes. In order to increase the maximum distance of distinct vision to infinity, the type and power of the connecting lens, the person has to use, will be _____.
 a) Concave, -0.2 diopter b) Convex, $+0.15$ diopter c) Convex, $+2.25$ diopter
 d) Concave, -0.25 diopter
24. Electrons of mass m with de-broglie wavelength λ fall on the target in an x-ray tube. The cutoff wavelength (λ_0) of the emitted x-ray is _____.
 a) $\lambda_0 = \frac{2m^2c^2\lambda^2}{h^2}$ b) $\lambda_0 = \lambda$ c) $\lambda_0 = \frac{2mc\lambda^2}{h}$ d) $\lambda_0 = \frac{2h}{mc}$
25. The ratio of escape velocity at earth (v_e) to the escape velocity at a planet (v_p) whose radius and mean density are twice as that of earth is
 a) $1 : 2$ b) $1 : 2\sqrt{2}$ c) $1 : 4$ d) $1 : \sqrt{2}$
26. A given sample of an ideal gas occupies a volume v at a pressure P and absolute temperature T . The mass of each molecule of the gas is m . Which of the following gives the density of a gas?
 a) $\frac{P}{KTV}$ b) $\frac{P}{KT}$ c) $\frac{Pm}{KT}$ d) mKT

27. An electric dipole is placed at an angle of 30° with an electric field intensity $2 \times 10^5 \text{ N/C}$. It experiences a torque equal to 4 Nm . The charge on the dipole, if the dipole length is 2 cm is

- a) $5 \mu\text{C}$ b) $7 \mu\text{C}$ c) $8 \mu\text{C}$ d) $2 \mu\text{C}$

28. Which of the following curves does not represent motion in one dimension?



29. A man in a balloon rising vertically with an acceleration of 4.9 ms^{-2} releases a stone 2 seconds after the balloon is let go from the ground. The greatest height above the ground reached by the stone is _____ . ($g=9.8 \text{ ms}^{-2}$)

- a) 9.8 m b) 14.7 m c) 19.6 m d) 24.5 m

30. A body starting from rest moves with constant acceleration. The ratio of distance covered by the body during the 5th second to that covered in 5 seconds is _____ .

- a) $\frac{9}{25}$ b) $\frac{3}{25}$ c) $\frac{25}{9}$ d) $\frac{1}{25}$

31. The component of vector $\vec{A}=2\hat{i}+3\hat{j}$ along the direction of $(\hat{i}+\hat{j})$ is _____ .

- a) $\frac{1}{\sqrt{2}}$ b) $\frac{5}{\sqrt{2}}$ c) $\frac{3}{\sqrt{2}}$ d) $\frac{7}{\sqrt{2}}$

32. If the scalar and vector products of two vectors \vec{A}, \vec{B} are equal in magnitude, then the angle between the two vectors is _____ .

- a) 45° b) 90° c) 180° d) 360°

33. A large force is acting on a body for a short time. The impulse imparted is equal to the change in _____ .

- a) acceleration b) momentum c) energy d) velocity

34. A battery of 10 V is connected to a capacitor of 0.1 F . The battery is now removed and the capacitor is then connected to a second uncharged capacitor of same capacitance. Calculate the total energy stored in the system?

- a) 2.6 J b) 2.7 J c) 2.5 J d) 2.8 J

35. A parallel plate capacitor is charged and then the charging battery is disconnected. The plates are further separated. The p.d between the plates will _____ .

- a) remains the same b) decrease c) increase d) first increase and then decrease

36. When a long spring is stretched by 2 cm , its potential energy is U . If the spring is stretched by 10 cm , the potential energy in it will be _____ .

- a) $25U$ b) $\frac{U}{5}$ c) $10U$ d) $5U$

37. Kirchoff's current law at a junction deals with conservation of _____ .

- a) charge b) energy c) momentum d) all

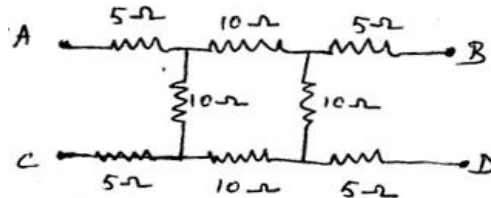
38. DC supply of 120 V is connected to a large resistance X . A voltmeter of resistance $10 \text{ k}\Omega$ placed in series in the circuit reads 4 V . What is the value of X ?

- a) $290 \text{ k}\Omega$ b) $280 \text{ k}\Omega$ c) $295 \text{ k}\Omega$ d) $290 \text{ k}\Omega$

39. For most materials the Young's modulus is n times the modulus of rigidity, where n is _____

- a) 2 b) 4 c) 5 d) 3

40. The equivalent resistance between the terminals A and D in the following circuit is _____ .



- a) 10Ω b) 20Ω c) 5Ω d) 30Ω

41. If the number of turns per unit length of a coil of solenoid is doubled, the self inductance of the solenoid will _____ .

- a) remain unchanged b) be halved c) be doubled d) become four times

42. The ratio of tensile stress to the longitudinal strain is defined as _____ .

- a) bulk modulus b) Young's modulus c) Shear modulus d) Compressibility

43. If λ_v, λ_x and λ_m represent the wavelengths of visible light, x-rays and microwaves respectively, then _____ .

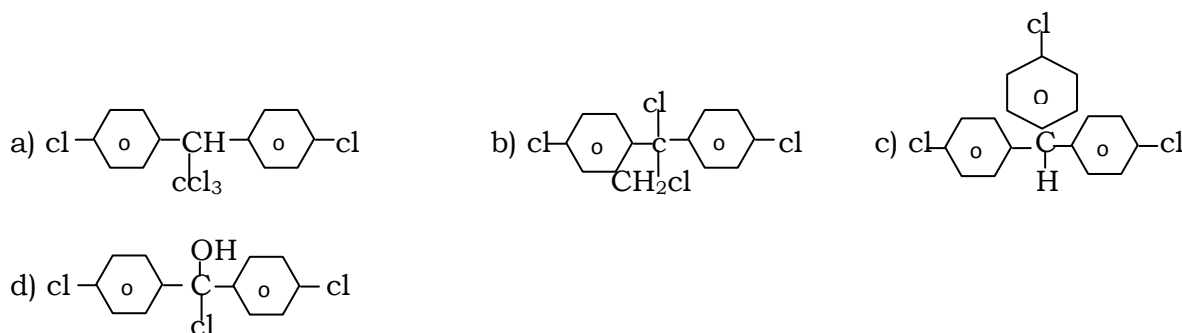
- a) $\lambda_m > \lambda_x > \lambda_v$ b) $\lambda_m > \lambda_v > \lambda_x$ c) $\lambda_v > \lambda_m > \lambda_x$ d) $\lambda_v > \lambda_x > \lambda_m$

44. Average density of the earth is _____.
- a) a complex function of g b) does not independent of g c) inversely proportional to g
 d) directly proportional to g .
45. In an electrical circuit R , L , C and AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and current in the circuit is $\frac{\pi}{3}$. Instead if C is removed then the circuit, the phase difference is again $\frac{\pi}{3}$. The power factor of the circuit is _____.
- a) $\frac{1}{2}$ b) $\frac{1}{\sqrt{2}}$ c) 1 d) $\frac{\sqrt{3}}{2}$

CHEMISTRY

46. Which one of the following statements is incorrect about enzyme catalysis?
- a) Enzymes are mostly proteinous in nature b) Enzyme action is specific
 c) Enzymes are least reactive at optimum temperature
 d) Enzymes are denatured by uv-rays and at high temperature
47. Boron has two stable isotopes, B^{10} (19%) and B^{11} (81%). Calculate the average atomic weight of boron in the periodic table
- a) 10.8 b) 10.2 c) 11.2 d) 10.0
48. The energy of an electron in the n^{th} Bohr orbit of hydrogen atom is
- a) $\frac{-13.6}{n^4}\text{ev}$ b) $\frac{-13.6}{n^3}\text{ev}$ c) $\frac{-13.6}{n^2}\text{ev}$ d) $\frac{-13.6}{n}\text{ev}$
49. If r is the radius of the first orbit, the radius of n^{th} orbit of H-atom is given by
- a) m b) rn^2 c) $\frac{r}{n}$ d) r^2n^2
50. Among the following compound one that is most reactive towards electrophilic nitration is
- a) benzoic acid b) nitrobenzene c) toluene d) benzene
51. The number of possible isomers of the compound with molecular formula C_7H_8O is
- a) 3 b) 5 c) 7 d) 9
52. How many primary, secondary, tertiary and quaternary carbons are present in the following hydrocarbon $CH_3-CH(CH_3)-C(CH_3)_2-CH_2-CH(CH_3)-CH_2-CH_3$
- a) Primary-2, secondary-6, tertiary-3, quaternary-0
 b) Primary-6, secondary-2, tertiary-2, quaternary-1
 c) Primary-2, secondary-4, tertiary-3, quaternary-2
 d) Primary-2, secondary-2, tertiary-4, quaternary-3
53. Which of the following is paramagnetic?
- a) CO b) CN^- c) O_2^- d) NO^+
54. If molality of the dilute solution is doubled, the value of molal depression constant (K_f) will be
- a) doubled b) halved c) tripled d) unchanged
55. The addition of a catalyst during a chemical reaction alters which of the following quantities?
- a) internal energy b) enthalpy c) Activation energy d) entropy
56. Which one of the following is incorrect for ideal solution?
- a) $\Delta H_{\text{mix}} = 0$ b) $\Delta U_{\text{mix}} = 0$ c) $\Delta P = P_{\text{ob}}^- - P_{\text{calculated}} = 0$ d) $\Delta G_{\text{mix}} = 0$
57. Blood cells retain their normal shape in solutions which are
- a) isotonic to blood b) hypotonic to blood
 c) hypertonic to blood d) equinormal to blood
58. An element, x has the following isotopic composition: x^{200} :90%, x^{199} :8.0%, x^{202} :2.0%
 The weighed average atomic mass of the naturally occurring element x is closest to _____.
- a) 201 u b) 200 u c) 202 u d) 199 u
59. Nylon is an example for
- a) Polyester b) Polysaccharide c) Polyamide d) Polythene
60. In graphite, electrons are
- a) localized on each c-atom b) localized on every third c-atom
 c) spread out between the structures d) both (b) and (c)
61. Liquid hydrocarbons can be converted to a mixture of gaseous hydrocarbons by
- a) oxidation b) cracking c) distillation under reduced pressure d) hydrolysis

62. The correct order of atomic radii in group 13 elements is
 a) $B < Al < In < Ga < Tl$ b) $B < Ga < Al < Tl < In$ c) $B < Al < Ga < In < Tl$
 d) $B < Ga < Al < In < Tl$
63. The sequence of ionic mobility in aqueous solution is
 a) $K^+ > Na^+ > Rb^+ > Cs^+$ b) $Cs^+ > Rb^+ > K^+ > Na^+$ c) $Rb^+ > K^+ > Cs^+ > Na^+$ d) $Na^+ > K^+ > Rb^+ > Cs^+$
64. Which one of the following is used to make non-stick cookware?
 a) PVC b) Polystyrene c) Polyethylene terephthalate d) Polytetrafluoro ethylene
65. The most stable configuration of n-butane will be
 a) Skew boat b) eclipsed c) gauche d) staggered-anti
66. Reactivity of hydrogen atoms attached to different carbon atoms in alkanes has the order
 a) tertiary > primary > secondary b) primary > secondary > tertiary
 c) Both (a) and (b) d) tertiary > secondary > primary
67. Be^{2+} is iso electronic with which of the following ions?
 a) Na^+ b) Mg^{2+} c) H^+ d) Li^+
68. Carbon-14 dating method is based on the fact that
 a) c-14 fraction is same in all objects b) carbon-14 is highly insoluble
 c) ratio of c-14 and c-12 is constant d) all of these
69. According to Raoult's law relative lowering of vapour pressure of a solution is equal to
 a) Molarity b) Molality c) Formality d) Normality
70. If the equilibrium constant for $\frac{1}{2} N_{2(g)} + \frac{1}{2} O_{2(g)} \rightleftharpoons NO_{(g)}$ will be
 a) $\frac{1}{2}K$ b) K c) $K^{\frac{1}{2}}$ d) K^2
71. Correct gas equation is
 a) $\frac{V_1 T_2 = V_2 T_1}{P_1 P_2}$ b) $\frac{P_1 T_1 = P_2 V_2}{V_1 T_2}$ c) $\frac{V_1 V_2 = P_1 P_2}{T_1 T_2}$ d) $\frac{P_1 V_1 = T_1}{P_2 V_2 T_2}$
72. According to Le-chatlier's principle, adding heat to a solid \rightleftharpoons liquid equilibrium will cause the
 a) temperature to increase b) temperature to decrease
 c) amount of solid to decrease d) amount of liquid to decrease
73. The number of geometrical isomers for $[Pt(NH_3)_2Cl_2]$ is
 a) 3 b) 4 c) 1 d) 2
74. Trichloroacetaldehyde, CCl_3CHO reacts with chlorobenzene in the presence of Sulphuric acid and produces



75. The pair of electron in the given carbanion, $CH_3C \equiv C^-$, is present in which orbitals?
 a) sp b) 2p c) sp^3 d) sp^2
76. Match column I with column II and assign the correct code.
- | Column-I | Column-II | Codes: |
|-----------------------------|-----------------------|------------|
| A. Cyanide process | 1. Ultra pure Ge | A B C D |
| B. Froth floatation process | 2. Dressing of ZnS | a) 2 3 1 5 |
| C. Electrolytic reduction | 3. Extraction of Al | b) 1 2 3 4 |
| D. Zone refining | 4. Extraction of Au | c) 4 2 3 1 |
| | 5. Purification of Ni | d) 3 4 5 1 |
77. Among the element with following electronic configuration, which one may have the highest ionisation energy?
 a) $[Ne]3s^2 3p^2$ b) $[Ar]3d^{10} 4s^2 4p^3$ c) $[Ne]3s^2 3p^3$ d) $[Ne]3s^2 3p^1$

78. For the ideal phase reaction $\text{Pcl}_{5(g)} \rightleftharpoons \text{Pcl}_{3(g)} + \text{cl}_{2(g)}$
Which of the following conditions are correct?
a) $\Delta H=0$ and $\Delta S<0$ b) $\Delta H<0$ and $\Delta S<0$ c) $\Delta H>0$ and $\Delta S<0$ d) $\Delta H>0$ and $\Delta S>0$
79. During osmosis, flow of water through a semipermeable membrane is
a) from solution having higher concentration only
b) from both sides of semi permeable membrane with equal flow rates
c) from both sides of semi permeable membrane with unequal flow rates
d) from solution having lower concentration only
80. For the first order reaction, the half life period is independent of
a) cube root of initial concentration b) first power of initial concentration
c) square root of initial concentration d) initial concentration
81. The central dogma of molecular genetics states that the genetic information flows from
a) amino acid \rightarrow proteins \rightarrow DNA b) DNA \rightarrow Carbohydrates \rightarrow Proteins
c) DNA \rightarrow RNA \rightarrow Proteins d) DNA \rightarrow RNA \rightarrow Carbohydrates
82. The functional group which participates in disulphide bond formation in proteins?
a) Thiolactone b) Thiol c) Thioether d) Thioester
83. An example of biopolymer is
a) Teflon b) neoprene c) nylon-66 d) DNA
84. The helical structure of protein is stabilized by
a) dipeptide bonds b) ether bonds c) hydrogen bonds d) peptide bond
85. Which of the following statements about hydrogen is incorrect?
a) hydrogen never acts as cation in ionic salts
b) hydronium ion, H_3O^+ exists freely in solution
c) Dihydrogen does not act as a reducing agent
d) hydrogen has three isotopes of which tritium is the most common
86. Water gas is produced by
a) mixing oxygen and hydrogen in the ratio of 1:2
b) heating mixture of CO_2 and CH_4 in petroleum refineries
c) passing steam through a red hot coke bed
d) saturating hydrogen with moisture
87. Which of the following ions will exhibit colour in aqueous solutions?
a) $\text{Lu}^{3+}(z=71)$ b) $\text{Sc}^{3+}(z=21)$ c) $\text{La}^{3+}(z=57)$ d) $\text{Ti}^{3+}(z=22)$
88. Which of the compounds has the lowest boiling point?
a) $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_3$ b) $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_3$ c) $\text{CH}_3\text{-CH=CH-CH}_2\text{-CH}_3$
d) $\text{CH}_3\text{-CH=CH-CH=CH}_2$
89. Lucas reagent is
a) Con. HNO_3 and anhy. Zncl_2 b) Con. Hcl and anhy. Zncl_2
c) Con. Hcl and hydrous Zncl_2 d) Con. HNO_3 and hydrous Zncl_2
90. Suppose the elements x and y combine to form two compounds xy_2 and x_3y_2 . When 0.1 mole of xy_2 weighs 10g and 0.05 mole of x_3y_2 weighs 9g, the atomic weights of x and y are
a) 60, 40 b) 20, 30 c) 40, 30 d) 30, 20

BIO – BOTANY

91. Which of the following is correct set of micronutrients for plants?
 a) Mg, Si, Fe, Cu, Ca b) Mg, Fe, Zn, B, Mn c) Cu, Fe, Zn, B, Mn d) Mo, Zn, Cl, Mg, Ca
92. Which of the following formula describes N_2 fixation?
 a) $N_2 + 3H_2 \rightarrow 2NH_3$ b) $2NH_3 \rightarrow N_2 + 3H_2$
 c) $2NH_4^{4+} + 2O_2 + 8e^- \rightarrow N_2 + 4H_2O$ d) $2N_2 + \text{glucose} \rightarrow 2 \text{ aminoacids}$
93. The exclusive constituents of chlorophyll molecules are _____
 a) Fe and S b) N and S c) Mg & N d) Mg and S
94. Deficiency of chlorine in plant causes _____.
 a) stunted growth b) wilting c) necrosis d) all of these
95. Anemophily type of pollination is found in _____.
 a) Salvia b) bottle brush c) Vallisneria d) coconut
96. Male gametes in angiosperms are formed by the division of _____.
 a) generative cell b) vegetative cell c) microspore mother cell d) microspore
97. Manganese is required in _____.
 a) plant cell wall formation b) Chlorophyll synthesis
 c) Photolysis of water during photosynthesis d) Nucleic acid synthesis
98. Nitrogen fixation in root nodules of sinus is brought about by _____.
 a) Azorhizobium b) Frankia c) Bradyrhizobium d) Clostridium
99. Who proposed chemiosmotic theory?
 a) Hatch & Slack b) Calvin c) Arnon d) Peter Mitchell
100. RUBISCO is an enzyme for _____.
 a) Photorespiration b) CO_2 fixation in dark reaction
 c) Regeneration of RUBP d) Photolysis of water
101. The CO_2 is evolved in the following reaction of TCA cycle.
 a) Citric acid \rightarrow α Ketoglutarate b) Succinate \rightarrow Malate
 c) α Keto glutarate \rightarrow Succinyl coA d) Malate \rightarrow Oxalo acetate
102. The requirement of assimilatory power to fix 6 molecules of CO_2 is _____.
 a) 6ATP 6NADPH b) 12ATP 18NADPH c) 18ATP 18 NADPH d) 18ATP 12NADPH
103. Largest amount of phosphate bond energy is produced during _____.
 a) glycolysis b) TCA cycle c) fermentation d) anaerobic respiration
104. In Mesophyll of C_4 plant cells which of the following cycle takes place
 a) C_1 b) C_3 c) C_2 d) C_4
105. In C_4 plants CO_2 combines with _____.
 a) Phospho glycerol dehydrogenase b) Phosphoglyceric acid
 c) Phosphoenol pyruvate d) Ribulose diphosphate
106. Who first demonstrated that light absorption by chloroplast releases O_2 ?
 a) Blackmann b) Engleman c) Hill d) Ingenhousz
107. In glycolysis, formation of ATP during the reactions 1,3 Bisphosphoglyceric acid \rightarrow 3 phosphoglyceric acid and PEP \rightarrow Pyruvate is _____.
 a) respiratory phosphorylation b) oxidative phosphorylation
 c) chemical phosphorylation d) substrate level phosphorylation
108. R-Q is infinite in
 a) anaerobic respiration b) aerobic respiration c) Carbohydrate d) None of these
109. How many ATP is produced when $FADH_2$ enters etc.,
 a) 1 b) 3 c) 2 d) 4
110. In photorespiration, glycerine enters from _____.
 a) chloroplast to peroxisome b) mitochondrion to peroxisome
 c) chloroplast to mitochondrion d) peroxisome to mitochondrion
111. Acetyl-CoA is produced from pyruvate by _____.
 a) photorespiration b) oxidative decarboxylation
 c) oxidative phosphorylation d) oxidative hydrogenation

112. During movement electron through DTC
 a) electrons are transported by active transport b) electrons are resonated
 c) P^H of Matrix increase d) electrons show florescence
113. The poly embryony commonly occurs in _____.
 a) tomato b) potato c) turmeric d) citrus
114. Which one of the following is a free living obligate anaerobic bacteria?
 a) Clostridium b) Rhodo Spirillum c) Azotobacter d) Bacillus Subtilis
115. Manganese is essential for _____.
 a) Photolysis of water b) Formation of spindle c) rate in closure of stomata
 d) Maintains ribosome structure
116. Ruminant endosperm is found in _____.
 a) Cruciferae b) Asteraceae c) Euphorbiaceae d) Annonaceae
117. Last electron acceptor in respiration is _____.
 a) H_2 b) O_2 c) CO_2 d) NADH
118. _____ breaks the dormancy of potato tuber.
 a) IAA b) ABA c) Zeatin d) Gibberlin
119. Select the wrong statement
 a) RQ of tripalmitin is 0.7
 b) Glycolysis is also called as EMP Pathway
 c) Intermediate of glycolysis & TCA cycle is malic acid
 d) Fermentation yields 2 ATP Intermediate is Acetyl-CoS
120. Pyruvate dehydrogenase action resembles
 a) ZDH b) α KG DH c) SDH d) all the three
121. Test cross is a cross in between hybrid and _____.
 a) heterozygous recessive b) heterozygous dominant c) homozygous recessive
 d) homozygous dominant
122. Which of the element is not remobilised in leaf?
 a) N_2 b) Phosphorus c) K^+ d) Ca^{2+}
123. Aerobic respiratory pathway is appropriately termed as _____.
 a) parabolic b) amphibolic c) anabolic d) catabolic
124. Vegetative propagation in pistia occurs by _____.
 a) stolon b) offset c) runner d) sucker
125. For synthesis of glucose molecule the calvin cycle operates for
 a) 2 times b) 4 times c) 6 times d) 8 times
126. Mention the status of the reaction (A): $cy^{2+} \xrightarrow{2e^-} cy^{3+}$ (A)
 a) oxidised b) reduced c) phosphorylated d) hydrated
127. The 680nm P_{680} is reaction centre of _____.
 a) PSI b) PSII c) both a & b d) None of these
128. Stock and Scion are used in _____.
 a) grafting b) cutting c) layering d) Micro propagation
129. Auxin is synthesized in which part of plant?
 a) nodal b) Internodal c) Apical d) Auxillary
130. Air layering is performed in case of _____.
 a) Grapevine b) Gooseberry c) Jasmine d) Litchi
131. Contrivances of self pollination are _____.
 a) bisexuality b) homogamy c) cleistogamy d) all of these
132. Palynology is the study of _____.
 a) palms b) flowers c) fruits d) pollen grain
133. Primary endosperm Nucleus is formed by the fusion of _____.
 a) 2 polar nuclei + 1 synergid cell nucleus
 b) 2 polar nuclei + 1 male gamete nucleus
 c) 1 polar nucleus + 1 antipodal cell nucleus + 1 synergid cell nucleus
 d) 2 antipodal cell nuclei + 1 male gamete nucleus

134. Under water pollination occurs in _____.
- a) Vallisneria b) Nymphaea c) Zostera d) Ottelia
135. Leaf Abcission occurs by _____.
- a) Auxin b) Cytokinin c) Gibberlin d) Abscisic acid

BIO-ZOOLOGY

136. Which is not an epidermal derivative?
- a) Hair b) mammary gland c) Horns d) Salivary glands
137. Erythropoietin is secreted by JMN when there is a _____.
- a) decrease in RBC number b) Increase in RBC number
c) Acute mountain sickness d) When there is a decrease in RBC and AMS
138. Cones and colour perception is due to _____.
- a) X-linked recessive gene b) X-linked dominant gene c) Y-linked recessive gene
d) Y-linked dominant gene
139. X-linked inheritance was discovered by _____.
- a) Mendel b) Yule c) T.H.Morgan d) Landsteiner
140. Hypothyroidism in adults causes myxedema which is referred also as _____.
- a) Turner's Syndrome b) Gull's disease c) Grave's disease d) Cretinism
141. Old age people become sick due to the absence of the hormone _____.
- a) FSH b) STH c) LH d) Thymosin
142. Vasodialation is promoted by _____.
- a) Zinc b) Natriuretic peptide c) Sulphate d) Angiotensin-II
143. Identify the vestigial organ in Human.
- a) Kidney b) Thymus c) Appendix d) Caecum
144. The regulatory substance Renin is secreted by _____.
- a) Juxta glomerular apparatus b) Iymph node c) Muscles d) WBC
145. Brunner's gland is located in _____.
- a) duodenum b) small intestine c) large intestine d) Oesophagus
146. Diabetes insipidus is caused by _____.
- a) Hyposecretion of Insulin b) Hyper secretion of Insulin
c) Hyper recreation of ADH d) Hyposecretion of ADH
147. Podocytes in Bowman's capsule play a role in _____.
- a) holding the glomeruli b) increasing filtration c) decreasing filtration
d) increasing net filtration pressure
148. Luteinizing hormone stimulates _____.
- a) Thyroid b) Kidney c) Para thyroid d) Leydigcells
149. The apparatus used to record muscle contraction.
- a) Polygraph b) ECG c) EEG d) Kymograph
150. Which hormone is responsible of parturition?
- a) Relaxin b) Progesterone c) Oxytocin d) Oesterogen
151. I band is also called as _____.
- a) light band b) dark band c) myofibrils d) H-Zone
152. Select the correct sequence of the following.
- a) Rhodopsin bleaching → retinene + energy + scotopsin + nerve impulse
b) Rhodopsin bleaching → nerve impulse + scotopsin + energy + retinene
c) Rhodopsin bleaching → retinene + scotopsin + energy + nerve impulse
d) Scotopsin → retinene + energy + Rhodopsin bleaching + nerve impulse
153. The term applied to rapid heartbeat or pulse rate is _____.
- a) Brady cardia b) cardiac cycle c) palpitation d) tachycardia
154. Addison's disease is caused by _____.
- a) Hyposecretion of Glucorticoids
b) Hypersecretion of Glucocorticoids
c) Hyposecretion of Mineralocorticoids
d) Hyposecretion of gluco corticoids and Mineralocorticoids

155. Compact mass of cells during embryogenesis is called as _____.
 a) blastula b) Morula c) Neurula d) Gastrula
156. Which one of the following animals has two separate circulatory pathways?
 a) Snake b) Whale c) Fish d) Frog
157. Semilunar valve is found in _____.
 a) Right septum b) Left septum c) Aorta d) Veins
158. Histamine is secreted by one of the WBC which is a granulocyte _____.
 a) Neutrophil b) Eosinophil c) Platelets d) Basophil
159. *Antheraea assamensis* produces _____ silk.
 a) Mulberry silk b) Tussar c) Muga d) Eri
160. Human ovum is _____.
 a) Micro lecithal b) Mega lecithal c) Macro lecithal d) A lecithal
161. Sertoli cells are found in the _____.
 a) Adrenal cortex and secrete adrenaline
 b) Seminiferous tubules and provide nutrition to germ cells
 c) Pancreas and secrete progesterone
 d) Ovaries and secrete progesterone
162. Which is referred as endemic goitre _____.
 a) Exophthalmic goitre b) Cretinism c) Myxedema d) Simple goitre
163. Which one is an accessory excretory organ?
 a) Stomach b) Testis c) Liver d) Heart
164. ABO blood group system was identified by _____.
 a) T.H.Morgan b) Yule c) Ransteiner d) Wiener
165. A person with blood group will have a genotype
 a) $I^O I^B$ b) $I^A I^A$ and $I^A I^B$ c) $I^A I^A$ and $I^O I^A$ d) $I^A I^B$ and $I^O I^O$
166. GFR of kidney is
 a) 120 ml/min b) 115 ml/min c) 125 ml/min d) 130 ml/min
167. The process of filtering the blood of a damaged kidney is _____.
 a) Haemostasis b) Haemopoiesis c) osmoregulation d) Haemodialysis
168. Meiosis I results in _____ male.
 a) Secondary Oocyte b) Primary Oocyte c) Spermatid d) Sperm
169. Find out the internal parasite.
 a) Ancylostoma b) Nereis c) Hirudinaria d) Aedes
170. ATPase is the enzyme located in _____.
 a) Myosin b) Troponin c) F-Actin d) G-actin
171. Which organism is referred as Living fossil?
 a) King prawn b) Limulus c) Honey bee d) Crab
172. Which belongs to Aptera?
 a) Beetle b) Dragon fly c) Silver fish d) Silkworm
173. Which protein is globular in nature?
 a) Myosin b) Troponin c) Actin d) Keratin
174. If there is no fertilization of ovum how many polar body is formed in woman?
 a) 1 b) 2 c) 3 d) 0
175. Bowman's capsule is found in _____.
 a) glomerulus b) uriniferous tubule c) Malphigian capsule d) nephron
176. Earthworm has _____ pairs of ciliary rosettes.
 a) 1 b) 2 c) 3 d) 19
177. Ileum is characterised by _____.
 a) Brunner's gland and villi (leaf shape) b) Brunner's gland and club shaped villi
 c) Peyer's patches & Brunner's gland d) Club shaped villi & Peyer's patches
178. Male Haploidy is seen in _____ organisms.
 a) Birds b) Aphid c) Starfish d) Cow
179. Cholecystokinin stimulates _____.
 a) Gall bladder b) Pancreas c) Kidney d) Liver
180. Pancreatic amylase is related to the digestion of _____.
 a) carbohydrate b) fat c) protein d) None of these

MATHEMATICS

91. Circle(s) touching x-axis at a distance 3 from the origin and having an intercept of length $2\sqrt{7}$ on y-axis is (are)
 a) $x^2+y^2-6x+7y+9=0$ b) $x^2+y^2-6x-8y+9=0$ c) $x^2+y^2-6x+8y+9=0$ d) $x^2+y^2-6x-7y+9=0$
92. If α and β are the roots of the equation $x^2-x+1=0$, then $\alpha^{2009} + \beta^{2009} =$
 a) -2 b) -1 c) 2 d) ∞
93. Consider the system of linear equation $x_1+2x_2+x_3=3$; $2x_1+3x_2+x_3=3$; $3x_1+5x_2+2x_3=1$. The system has _____.
 a) infinite number of solutions b) exactly 3 solutions c) a unique solution
 d) no solution
94. Volume of parallelepiped determined by vectors \vec{a} , \vec{b} and \vec{c} is 5. Then the volume of parallelepiped determined by vectors $3(\vec{a}+\vec{b})$, $(\vec{b}+\vec{c})$ and $2(\vec{c}+\vec{a})$ is _____.
 a) 24 b) 100 c) 30 d) 60
95. Area of triangle with adjacent sides determined by vectors \vec{a} and \vec{b} is 20. Then the area of the triangle with adjacent sides determined by vectors $(2\vec{a}+3\vec{b})$ and $\vec{a}-\vec{b}$ is
 a) 24 b) 100 c) 60 d) 30
96. Let ABC be a triangle such that $\angle ACB = \frac{\pi}{6}$ and let a, b and c denote the lengths of the sides opposite to A, B and C respectively. The values of x for which $a=x^2+x+1$, $b=x^2-1$ and $c=2x+1$ is (are)
 a) $-(2+\sqrt{3})$ b) $2+\sqrt{3}$ c) $4\sqrt{3}$ d) $1+\sqrt{3}$
97. The value of $\int_0^1 \frac{x^4(1-x)^4}{1+x^2} dx$ is _____
 a) $\frac{2}{105}$ b) 0 c) $\frac{22}{7} - \pi$ d) $\frac{71}{15} - \frac{3\pi}{2}$
98. Let ω be a complex cube root of unity with $\omega \neq 1$ and $P=(P_{ij})$ be a $n \times n$ matrix with $P_{ij} = \omega^{i+j}$. Then $P^2 \neq 0$, when $n =$ _____.
 a) 55, 57, 58 b) 55, 56, 57 c) 55, 56, 58 d) 56, 57, 58
99. Two lines $L_1: x=5, \frac{y}{3-\alpha} = \frac{z}{-2}$ and $L_2: x=\alpha, \frac{y}{-1} = \frac{z}{2-\alpha}$ are coplanar. Then α can take values
 a) 1, 2 b) 2, 4 c) 1, 4 d) 3, 2
100. Area of parallelogram with adjacent sides determined by vectors \vec{a} and \vec{b} is 30. Then the area of the parallelogram with adjacent sides determined by vectors $(\vec{a}+\vec{b})$ and \vec{a} is _____.
 a) 30 b) 100 c) 60 d) 24
101. Consider the lines $L_1: \frac{x-1}{2} = \frac{y}{-1} = \frac{z+3}{1}$, $L_2: \frac{x-4}{1} = \frac{y+3}{1} = \frac{z+3}{2}$ and the planes $P_1: 7x+y+2z=3$, $P_2: 3x+5y-6z=4$. Let $ax+by+cz=d$ be the equation of the plane passing through the point of intersection of lines L_1 and L_2 and perpendicular to planes P_1 and P_2 Match List-I with List-II
 select the correct answer using the code given below the lists.
- | | List I | List II | P | Q | R | S |
|---|--------|---------|------|---|---|---|
| P | a= | 1. 13 | a) 1 | 3 | 4 | 2 |
| Q | b= | 2. -3 | b) 3 | 2 | 4 | 1 |
| R | c= | 3. 1 | c) 3 | 2 | 1 | 4 |
| S | d= | 4. -2 | d) 2 | 4 | 1 | 3 |
102. Volume of parallelepiped determined by vectors \vec{a} , \vec{b} and \vec{c} is 2. Then the volume of parallelepiped determined by vectors $2(\vec{a} \times \vec{b})$, $3(\vec{b} \times \vec{c})$ and $(\vec{c} \times \vec{a})$ is _____.
 a) 100 b) 24 c) 30 d) 60

103. $\left\{ \frac{1}{y^2} \left(\frac{\cos(\tan^{-1}y) + y \sin(\tan^{-1}y)}{\cot(\sin^{-1}y) + \tan(\sin^{-1}y)} \right)^2 + y^4 \right\}^{\frac{1}{2}}$ takes value _____.

- a) 1 b) $\sqrt{2}$ c) $\frac{1}{2} \sqrt{\frac{5}{3}}$ d) $\frac{1}{2}$

104. Equation of the plane containing the straight line $\frac{x-y}{2} = \frac{z}{4}$ and perpendicular to the plane containing the straight lines $\frac{x-y}{3} = \frac{z}{4}$ and $\frac{x-y}{4} = \frac{z}{3}$ is _____.

- a) $x+2y-2z=0$ b) $3x+2y-2z=0$ c) $5x+2y-4z=0$ d) $x-2y+z=0$

105. If $\cot(\sin^{-1}\sqrt{1-x^2}) = \sin(\tan^{-1}(x\sqrt{6}))$, $x \neq 0$, then possible value of x is _____.

- a) 1 b) $\frac{1}{2}$ c) $\sqrt{2}$ d) $\frac{1}{2} \sqrt{\frac{5}{3}}$

106. Let $P(6,3)$ be a point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If the normal at the point P intersects the x -axis at $(9, 0)$, then the eccentricity of the hyperbola is _____.

- a) $\sqrt{\frac{5}{2}}$ b) $\sqrt{\frac{3}{2}}$ c) $\sqrt{2}$ d) $\sqrt{3}$

107. If $\cos x + \cos y + \cos z = 0 = \sin x + \sin y + \sin z$ then possible value of $\cos\left(\frac{x-y}{2}\right)$ is _____.

- a) 1 b) $\frac{1}{2}$ c) $\sqrt{2}$ d) $\frac{1}{2} \sqrt{\frac{5}{3}}$

108. The number of 3×3 matrices A whose entries are either 0 or 1 and for which the system

$$A \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \text{ has exactly two distinct solutions is _____.$$

- a) $2^9 - 1$ b) 168 c) 0 d) 2

109. If \vec{a} and \vec{b} are vectors in space given by $\vec{a} = \frac{\vec{i} - 2\vec{j}}{\sqrt{5}}$ and $\vec{b} = \frac{2\vec{i} + \vec{j} + 3\vec{k}}{\sqrt{14}}$ then the value of

$$(2\vec{a} + \vec{b}) \cdot [(\vec{a} \times \vec{b}) \times (\vec{a} - 2\vec{b})]$$

- a) -25 b) 25 c) -5 d) 5

110. If the angles A, B and C of a triangle are in an arithmetic progression and if a, b and c denote the lengths of the sides opposite to A, B and C respectively, then the value of the expression $\frac{a}{c} \sin 2c + \frac{c}{a} \sin 2A$ is _____.

- a) $\frac{1}{2}$ b) $\sqrt{3}$ c) 1 d) $\frac{\sqrt{3}}{2}$

111. Let ω be a complex cube root of unity with $\omega \neq 1$. A fair dice is thrown three times. If r_1, r_2 and r_3 are the numbers obtained on the die, then the probability that $\omega^{r_1} + \omega^{r_2} + \omega^{r_3} = 0$ is

- a) $\frac{1}{18}$ b) $\frac{1}{9}$ c) $\frac{2}{9}$ d) $\frac{1}{36}$

112. Let E and F be two independent events. The probability that exactly one of them occurs is $\frac{11}{25}$ and the probability of none of them occurring is $\frac{2}{25}$. If $P(T)$ denotes the probability of occurrence of the event T , then,

- a) $P(E) = \frac{4}{5}, P(F) = \frac{3}{5}$ b) $P(E) = \frac{1}{5}, P(F) = \frac{2}{5}$ c) $P(E) = \frac{2}{5}, P(F) = \frac{1}{5}$ d) $P(E) = \frac{3}{5}, P(F) = \frac{4}{5}$

113. The line $2x+y=1$ is the tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If this line passes through the point of intersection of the nearest directrix and the x -axis then the eccentricity of the hyperbola is _____.

- a) $\sqrt{3}$ b) 2 c) 3 d) $\sqrt{2}$

114. Let $P = \left\{ \frac{\theta}{\sin\theta - \cos\theta = \sqrt{2} \cos\theta} \right\}$ and $Q = \left\{ \frac{\theta}{\sin\theta + \cos\theta = \sqrt{2} \sin\theta} \right\}$ be two sets. Then _____

- a) $P \subset \theta$ and $\theta - P \neq \varnothing$ b) $\theta \notin P$ c) $P \neq Q$ d) $P \subset Q$

128. If P is a 3x3 matrix such that $P^T=2P+I$ where P^T is the transpose of P and I is the 3x3

identity matrix then there exists a column matrix $X=\begin{pmatrix} x \\ y \\ z \end{pmatrix} \neq \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$ such that

- a) $PX=\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$ b) $PX=-X$ c) $PX=2X$ d) $PX=X$

129. If the straight lines $\frac{x-1}{2}=\frac{y+1}{k}=\frac{z}{2}$ and $\frac{x+1}{5}=\frac{y+1}{2}=\frac{z}{k}$ are coplanar, then the plane(s) containing these two lines is (are)

- a) $y+2z=-1$ b) $y-z=-1$ c) $y-2z=-1$ d) $y+z=-1$

130. Let $P=\begin{pmatrix} 1 & 0 & 0 \\ 4 & 1 & 0 \\ 16 & 4 & 1 \end{pmatrix}$ and I be the identity matrix of order 3. If $\theta=(q_{ij})$ is a matrix such that

$$P^{50}-Q=I \text{ then } \frac{q_{31}+q_{32}}{q_{21}}=$$

- a) 103 b) 201 c) 52 d) 205

131. Let P be the image of the point (3, 1, 7) with respect to the plane passing through P and containing the straight line $\frac{x}{1}=\frac{y}{2}=\frac{z}{1}$ is _____.

- a) $x+y-3z=0$ b) $x-4y+7z=0$ c) $2x-y=0$ d) $3x+z=0$

132. An urn contains nine balls of which three are red, four are blue and two are green. Three balls are drawn at random without replacement from the urn. The probability that the three balls have different colours is _____.

- a) $\frac{1}{3}$ b) $\frac{2}{7}$ c) $\frac{1}{21}$ d) $\frac{2}{23}$

133. Let $\vec{a}=\vec{i}+\vec{j}+\vec{k}$, $\vec{b}=\vec{i}-\vec{j}+\vec{k}$ and $\vec{c}=\vec{i}-\vec{j}-\vec{k}$ be three vectors. A vector \vec{v} in the plane of \vec{a} and \vec{b} , whose projection on \vec{c} is $\frac{1}{\sqrt{3}}$ is given by,

- a) $\vec{i}-3\vec{j}+3\vec{k}$ b) $-3\vec{i}-3\vec{j}-\vec{k}$ c) $3\vec{i}-\vec{j}+3\vec{k}$ d) $\vec{i}+3\vec{j}-3\vec{k}$

134. Distance between two parallel planes $2x+y+2z=8$ and $4x+2y+4z+5=0$ is _____.

- a) $\frac{3}{2}$ b) $\frac{7}{2}$ c) $\frac{5}{2}$ d) $9/2$

135. If the vectors $\vec{a}=\vec{i}-\vec{j}+2\vec{k}$, $\vec{b}=2\vec{i}+4\vec{j}+\vec{k}$ and $\vec{c}=\lambda\vec{i}+\vec{j}+\mu\vec{k}$ are mutually orthogonal, then $(\lambda, \mu)=$ _____

- a) (-3, 2) b) (2, -3) c) (-2, 3) d) (3, -2)

136. For two data sets, each of size 5, the variances are given to be 4 and 5 and the corresponding means are given to be 2 and 4 respectively. The variance of the combined data set is _____.

- a) $\frac{5}{2}$ b) $\frac{11}{2}$ c) 6 d) $\frac{13}{2}$

137. At present a firm is manufacturing 2000 items. It is estimated that the rate of change of production P w.r.t additional number of workers x is given by $\frac{dP}{dx}=100-12\sqrt{x}$. If the firm employs 25 more workers, then the new level of production of items is _____.

- a) 2500 b) 3500 c) 3000 d) 4500

138. Let A and B be two sets containing 2 elements and 4 elements respectively. The number of subsets of $A \times B$ having 3 or more elements is _____.

- a) 220 b) 219 c) 256 d) 211

139. Solution of the differential equation $\cos x \, dy=y(\sin x -y)dx$, $0 < x < \frac{\pi}{2}$ is

- a) $\sec x = (\tan x+c)y$ b) $y \sec x = \tan x + c$ c) $y \tan x = \sec x + c$ d) $\tan x = (\sec x+c)y$

140. Let $\vec{a}=\vec{j}-\vec{k}$ and $\vec{c}=\vec{i}-\vec{j}-\vec{k}$. Then the vector \vec{b} satisfying $\vec{a} \times \vec{b} + \vec{c}=\vec{0}$ and $\vec{a} \cdot \vec{b}=3$ is _____.
- a) $-\vec{i} + \vec{j} - 2\vec{k}$ b) $2\vec{i} - \vec{j} + 2\vec{k}$ c) $\vec{i} - \vec{j} - 2\vec{k}$ d) $\vec{i} + \vec{j} - 2\vec{k}$
141. If the lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{-k}$ and $\frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{1}$ are coplanar, then k can have _____.
- a) any value b) exactly one value c) exactly two values d) exactly three values
142. A multiple choice examination has 5 questions. Each question has three alternative answers of which exactly one is correct. The probability that a student will get 4 or more correct answers just by guessing is _____.
- a) $\frac{11}{3^5}$ b) $\frac{10}{3^5}$ c) $\frac{17}{3^5}$ d) $\frac{13}{3^5}$
143. If the vector $\overline{AB}=3\vec{i}+4\vec{k}$ and $\overline{AC}=5\vec{i}-2\vec{j}+4\vec{k}$ are the sides of a triangle ABC, then the length median through A is _____.
- a) $\sqrt{18}$ b) $\sqrt{33}$ c) $\sqrt{72}$ d) $\sqrt{45}$
144. If Z is a complex number of unit modulus and argument θ , then $\arg\left(\frac{1+z}{1+z}\right)$ equals
- a) $\frac{\pi}{2} - \theta$ b) $-\theta$ c) θ d) $\pi - \theta$
145. If $P=\begin{pmatrix} 1 & \alpha & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 4 \end{pmatrix}$ is the adjoint of 3x3 matrix and $|A|=4$, then α is equal to
- a) 5 b) 4 c) 11 d) 0
146. The sum of first 20 terms of the sequence 0.7, 0.77, 0.777 is _____.
- a) $\frac{7}{81} (179 - 10^{-20})$ b) $\frac{7}{9} (99 - 10^{-20})$ c) $\frac{7}{81} (179 + 10^{-10})$ d) $\frac{7}{9} (99 + 10^{-20})$
147. If the equations $x^2+2x+3=0$ and $ax^2+bx+c=0$, $a,b,c \in \mathbb{R}$, have a common root, then a:b:c is
- a) 3 : 2 : 1 b) 1 : 3 : 2 c) 1 : 2 : 3 d) 3 : 1 : 2
148. The circle passing through (1, -2) and touching the axis of x at (3, 0) also passes through the point _____.
- a) (-5, 2) b) (5, -2) c) (2, -5) d) (-2, 5)
149. If $\left|z - \frac{4}{z}\right|=2$, then the maximum value of $|z|$ is equal to _____.
- a) 2 b) $\sqrt{3}+1$ c) $\sqrt{5}+1$ d) $2\sqrt{2}$
150. Let A be a 2x2 matrix. Statement-1: $\text{adj}(\text{adj}A)=A$, Statement-2: $|\text{adj} A|=|A|$
- a) Statement-1 is true; Statement-2 is true. Statement-2 is not a correct explanation for statement 1.
- b) Statement-1 is true; statement-2 is true. Statement-2 is a correct explanation for statement-1.
- c) Statement-1 is true; statement-2 is false
- d) Statement-1 is false; statement-2 is true
151. A ray of lighting along $x+\sqrt{3}y=\sqrt{3}$ gets reflected upon reacting x-axis, the equation of the reflected ray is _____.
- a) $y=x+\sqrt{3}$ b) $y=\sqrt{3}x-\sqrt{3}$ c) $\sqrt{3}y=x-1$ d) $\sqrt{3}y=x-\sqrt{3}$
152. If x, y, z are in A.P and $\tan^{-1}x, \tan^{-1}y$ and $\tan^{-1}z$ are also in A.P then
- a) $2x=3y=6z$ b) $x = y = z$ c) $6x=3y=2z$ d) $6x=4y=3z$
153. The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and having centre at (0, 3) is _____.
- a) $x^2+y^2-6y+7=0$ b) $x^2+y^2-6y-5=0$ c) $x^2+y^2-6y-7=0$ d) $x^2+y^2-6y+5=0$

154. The x-coordinate of the incentre of the triangle that has the coordinates of midpoints of its sides as (0, 1) (1, 1) and (1, 0) is _____.
- a) $1+\sqrt{2}$ b) $1-\sqrt{2}$ c) $2+\sqrt{2}$ d) $2-\sqrt{2}$
155. The intercepts on x-axis made by tangents to the curve $y=\int_0^x t|t| dt$, $x\in\mathbb{R}$, which are parallel to the line $y=2x$ are equal to _____.
- a) ± 2 b) ± 1 c) ± 3 d) ± 4
156. If $y=\sec(\tan^{-1}x)$, then $\frac{dy}{dx}$ at $x=1$ is _____.
- a) $\frac{1}{2}$ b) 1 c) $\frac{1}{\sqrt{2}}$ d) $\sqrt{2}$
157. The area (in square units) bounded by the curves $y=\sqrt{x}$, $2y-x+3=0$, x-axis and lying in the first quadrant is _____.
- a) 36 b) 9 c) 18 d) $\frac{27}{4}$
158. Let T_n be the number of all possible triangles formed by joining vertices of a n-sided regular polygon. If $T_{n+1}-T_n=10$ then the value of n is _____.
- a) 5 b) 7 c) 10 d) 8
159. The area bounded by the curves $y=\cos x$ and $y=\sin x$ between the ordinates $x=0$ and $x=\frac{3\pi}{2}$ is
- a) $4\sqrt{2}-2$ b) $4\sqrt{2}+2$ c) $4\sqrt{2}-1$ d) $4\sqrt{2}+1$
160. The expression $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A}$ can be written as _____.
- a) $\sin A \cos A + 1$ b) $\sec A \operatorname{cosec} A + 1$ c) $\tan A + \cot A$ d) $\sec A + \operatorname{cosec} A$
161. The equation of the tangent to the curve $y=x+\frac{4}{x^2}$, that is parallel to the x-axis, is _____.
- a) $y=0$ b) $y=1$ c) $y=2$ d) $y=3$
162. All the students of a class performed poorly in Mathematics. The teacher decided to give grace marks of 10 to each of the students. Which of the following statistical measures will not change even after the grace marks were given?
- a) variance b) mean c) median d) mode
163. A person is to count 4500 currency notes. Let a_n denote the number of notes he counts in the n^{th} minute. If $a_1=a_2=\dots\dots=a_{10}=150$ and a_{10} , a_{11} are in an A.P with common difference -2, then the time taken by him to count all notes is _____.
- a) 24 minutes b) 34 minutes c) 125 minutes d) 135 minutes
164. A circle S passes through the point (0, 1) and is orthogonal to the circles $(x-1)^2+y^2=16$ and $x^2+y^2=1$
- a) radius of S is 8 b) centre of S is (-7, 1) c) radius of S is 7 d) centre of S is (-8, 1)
165. The slope of the tangent to the curve $(y-x^5)^2 = x(1+x^2)^2$ at the point (1, 3) is _____.
- a) 8 b) 7 c) 6 d) 5
166. The value of $\int_0^1 4x^3 \left\{ \frac{d^2}{dx^2} (1-x^2)^5 \right\}$ is _____.
- a) 10 b) 3 c) 4 d) 2
167. If the mean deviation of the numbers 1, $1+d$, $1+2d$, $1+100d$ from their mean is 255, then the d is _____.
- a) 10.1 b) 20.0 c) 10.0 d) 20.2
168. Let $f: \mathbb{R}\rightarrow\mathbb{R}$ be a positive increasing function with $\lim_{x\rightarrow x} \frac{f(3x)}{f(x)} = 1$. Then
- a) 1 b) $\frac{2}{3}$ c) $\frac{3}{2}$ d) 3

169. Let $P(x)$ be a function defined on \mathbb{R} such that $P^1(x)=P^1(1-x)$, for all, $x \in [0,1]$, $P(0)=1$ and $P(1)=41$. Then $\int_0^1 P(x)dx$ equals _____.
- a) $\sqrt{41}$ b) 21 c) 41 d) 42
170. If A, B and C are three sets such that $A \cap B = A \cap C$ and $A \cup B = A \cup C$ then _____.
- a) $A=B$ b) $B=C$ c) $A=C$ d) $A \cap B = \varnothing$
171. Let a, b, c be such that $b(a+c) \neq 0$. If $\begin{vmatrix} a & a+1 & a-1 \\ -b & b+1 & b-1 \\ c & c-1 & c+1 \end{vmatrix} + \begin{vmatrix} a+1 & b+1 & c-1 \\ a-1 & b-1 & c+1 \\ (-1)^{n+2}a & (-1)^{n+1}b & (-1)^n c \end{vmatrix} = 0$
- then the value of n is _____.
- a) zero b) any odd integer c) any even integer d) any integer
172. There are two urns. Urn A has 3 distinct red balls and urn B has 9 distinct blue balls. From each urn two balls are taken out at random and then transferred to the other. The number of ways in which this can be done is _____.
- a) 3 b) 36 c) 66 d) 108
173. Let the line $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$ lie in the plane $x+3y-az+\alpha=0$. Then (α, β) equals _____.
- a) (6, -17) b) (5, -15) c) (-5, 5) d) (-6, 7)
174. Let $f: (-1, 1) \rightarrow \mathbb{R}$ be a differentiable function $f(0)=-1$ and $f'(0)=1$. Let $g(x)=[f(2f(x)+2)]^2$. Then $g'(0)=$ _____.
- a) 4 b) -4 c) 0 d) -2
175. The projection of a vector on the three coordinate axis are 6, -3, 2 respectively. The direction cosines of the vector are _____.
- a) $\frac{6}{7}, \frac{-3}{7}, \frac{2}{7}$ b) $\frac{-6}{7}, \frac{-3}{7}, \frac{2}{7}$ c) 6, -3, 2 d) $\frac{6}{5}, \frac{-3}{5}, \frac{2}{5}$
176. Let M be a 3×3 matrix satisfying $M \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} -1 \\ 2 \\ 3 \end{pmatrix}$, $M \begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix}$ and $M \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 12 \end{pmatrix}$. Then the sum of the diagonal entries of M is _____.
- a) 12 b) 3 c) 9 d) 6
- Read the following line and answer for the question (177)
- The circle $x^2+y^2-8x=0$ and hyperbola $\frac{x^2}{9}-\frac{y^2}{4}=1$ intersect at the points A and B.
177. Equation of a common tangent with positive slope to the circle as well as to the hyperbola is
- a) $2x-\sqrt{5}y-20=0$ b) $2x-\sqrt{5}y+4=0$ c) $3x-4y+8=0$ d) $4x-3y+4=0$
- Read the following line and answer for the question (178), (179) and (180)
- Let a, b and c be three real numbers satisfying $(a \ b \ c) \begin{pmatrix} 1 & 9 & 7 \\ 8 & 2 & 7 \\ 7 & 3 & 7 \end{pmatrix} = (0 \ 0 \ 0)$
178. If the point $P(a, b, c)$ with reference to (E), lies on the plane $2x+y+z=1$, then the value of $7a+b+c$ is _____.
- a) 0 b) 12 c) 7 d) 6
179. Let ω be a solution of $x^3-1=0$ with $\text{Im}(\omega)>0$. If $a=2$ with b and c satisfying (E), then the value of $\frac{3}{\omega^a} + \frac{1}{\omega^b} + \frac{3}{\omega^c} =$ _____
- a) -2 b) 2 c) 3 d) -3
180. Let $b=6$, with a and c satisfying (E). If α and β are the roots of the quadratic equation $ax^2+bx+c=0$ then $\sum_{n=0}^{\infty} \left(\frac{1}{\alpha} + \frac{1}{\beta}\right)^n$ is _____.
- a) 6 b) 7 c) $\frac{6}{7}$ d) ∞