

15/04/2024

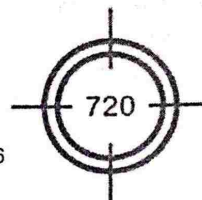


Aakash

Medical | IIT-JEE | Foundations

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CODE-A



AIM - 720

(Advanced **INTENSIVE** Mastery for 720)

MM : 720

CST-8

Time : 3 Hrs. 20 Mins.

Complete Syllabus of NEET

Instructions :

- There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
- Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.
- Use blue/black ballpoint pen only to darken the appropriate circle.
- Mark should be dark and completely fill the circle.
- Dark only one circle for each entry.
- Dark the circle in the space provided only.
- Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

PHYSICS

Choose the correct answer :

SECTION - A

- A 2 kg block is placed on a 3 kg block which in turn is placed on a 5 kg block. The whole system rests on a table. The normal force exerted on the 2 kg block by 3 kg block is
 - 30 N
 - 20 N
 - 50 N
 - 35 N
- The displacement (x) of a particle moving in a straight line is given by $x = 8t^2 - 4t$. The velocity of particle at $t = 1$ s is
 - 16 m s⁻¹
 - 12 m s⁻¹
 - 4 m s⁻¹
 - 2 m s⁻¹
- The position of a particle moving on a straight line is given by $x = 2t^2 + 6t$. The distance travelled by the object in third second is (where x is in metre and t is in second)

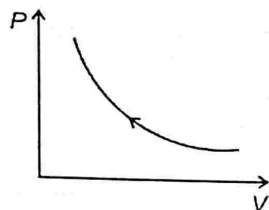
- 36 m
 - 20 m
 - 16 m
 - 10 m
- A particle revolves in a horizontal circle with constant speed. The angle between instantaneous velocity and instantaneous acceleration of particle at any instant is
 - Less than 90°
 - Greater than 90°
 - Equal to 90°
 - Equal to zero
 - The molar specific heat at constant volume for a monoatomic ideal gas is (Where R represents Universal Gas Constant)
 - $\frac{3R}{2}$
 - $\frac{5R}{2}$
 - $\frac{7R}{2}$
 - $2R$

(1)

6. A bob of mass m is attached to an inextensible string of length l suspended from a vertical support. The bob rotates in a horizontal circle with an angular speed ω about the vertical. About the point of suspension:
- Angular momentum is conserved
 - Angular momentum changes in magnitude but not in direction
 - Angular momentum changes in direction but not in magnitude
 - Angular momentum changes both in direction and magnitude
7. A wheel is rotating at 1800 rpm about its own axis. When the power is switched off, it comes to rest in 2 minutes. The angular retardation (assuming it to be constant) of the wheel in rad s^{-2} is
- 2π
 - π
 - $\frac{\pi}{2}$
 - $\frac{\pi}{4}$
8. If an object in a satellite escapes to infinity, then
- Total energy is positive
 - Total energy is zero
 - Total energy is negative
 - Both (1) and (2)
9. If a rubber ball is taken to the depth of 200 m in a pool, its volume decreases by 0.1%. If the density of the water is $1 \times 10^3 \text{ kg/m}^3$ and $g = 10 \text{ m/s}^2$, then the Bulk modulus of elasticity (in N/m^2) of ball is
- 10^8
 - 2×10^8
 - 10^9
 - 2×10^9
10. Which of the following set of physical quantities have different dimensional formula?
- Pressure, Young's modulus, stress
 - EMF, potential difference, electric potential
 - Heat, work done, torque
 - Electric dipole moment, electric field, electric flux
11. A particle of mass 2 kg is moving in circle of radius 4 m in such a way that its centripetal acceleration at time t is given by $4t^2$, where t is in second and acceleration is in (m s^{-2}) . The power delivered to the particle by the force acting on it, at $t = 2 \text{ s}$ is
- 16 W
 - 24 W
 - 32 W
 - 64 W
12. A spring stores 16 J of energy in a compression of 1 mm. The additional work to be done to compress it further by 2 mm is
- 48 J
 - 64 J
 - 96 J
 - 128 J
13. A long solenoid with 10 turns per cm carries a current of 1 A. The magnetic energy stored per unit volume is
- $0.2\pi \text{ J/m}^3$
 - $0.1\pi \text{ J/m}^3$
 - $0.4\pi \text{ J/m}^3$
 - $0.8\pi \text{ J/m}^3$
14. An emf $E = 220\sqrt{2} \sin(100t) \text{ V}$ is applied to a capacitor of $10 \mu\text{F}$. The r.m.s. current flowing through the capacitor is
- 22 mA
 - 220 mA
 - $22\sqrt{2} \text{ mA}$
 - $220\sqrt{2} \text{ mA}$
15. The expression of excess pressure inside an air bubble in liquid of radius r and surface tension T is given by
- $\frac{2T}{r}$
 - $\frac{4T}{r}$
 - $\frac{3T}{r}$
 - $\frac{T}{2r}$
16. The quantity of heat required to raise the temperature of 1 g of water by 1°C is
- 1 joule
 - 1 calorie
 - Water equivalent
 - Thermal capacity
17. An engine absorbs 3000 J of heat from certain hot reservoir and ejects 1500 J to a cold reservoir in every cycle. The net work done in each cycle would be
- 1500 J
 - 3000 J
 - 4500 J
 - Zero

Space for Rough Work

18. For the given adiabatic curve, the work done by the gas will be



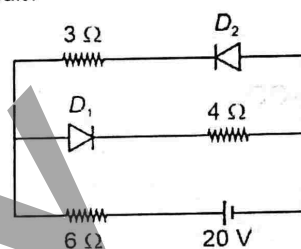
- (1) Positive (2) Negative
(3) Zero (4) Infinite
19. Which of the following has zero average value in a plane electromagnetic wave?
(1) Magnetic field (2) Electric field
(3) Total energy density (4) Both (1) and (2)
20. In Young's double slit experiment, a minima is obtained when the phase difference of superimposing waves is
(1) Zero (2) 2π
(3) 21π (4) 28π
21. A light wave has a frequency of 5×10^{14} Hz and a wavelength 2×10^{-7} m in a medium. The refractive index of the medium is
(1) 1 (2) 2
(3) 1.5 (4) 3
22. An object 4 cm high placed at a distance of 20 cm from a concave mirror of radius of curvature of 60 cm. The size of the image is
(1) 1 cm (2) 12 cm
(3) 4 cm (4) 10 cm
23. K_1 and K_2 are maximum kinetic energies of photoelectrons emitted when lights of wavelength λ_1 , λ_2 respectively are incident on a metallic surface. If $\lambda_1 = 4\lambda_2$, then

- (1) $K_1 > \frac{K_2}{4}$ (2) $K_1 < \frac{K_2}{4}$
(3) $K_1 = \frac{K_2}{4}$ (4) $K_2 = \frac{K_1}{4}$

24. If 250 MeV energy is released in the fission of a single nucleus of ${}^A_ZX$, the number of fissions per second which are required to produce a power of 2 kW is

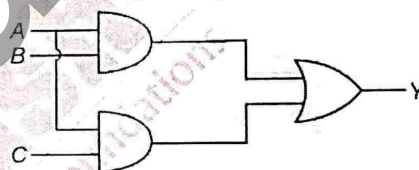
- (1) 1×10^{13} (2) 3×10^{13}
(3) 5×10^{13} (4) 8×10^{13}

25. The circuit has two oppositely connected ideal diodes in parallel. What is the current flowing in the circuit?



- (1) 2.5 A (2) 5 A
(3) 2 A (4) 3 A

26. The output of given logic circuit is



- (1) $(A + B) \cdot (A + C)$ (2) $A + B + C$
(3) $A \cdot B \cdot C$ (4) $A \cdot B + A \cdot C$

27. A particle executing simple harmonic motion along y-axis has its motion described by equation $y = A \sin \omega t + B$. The amplitude of the given simple harmonic motion is

- (1) A (2) B
(3) $A + B$ (4) $\sqrt{A^2 + B^2}$

28. Two waves having the intensities in the ratio 4 : 1 produce interference. The ratio of maximum to minimum intensity is equal to

- (1) 2 : 1 (2) 4 : 1
(3) 9 : 1 (4) 5 : 4

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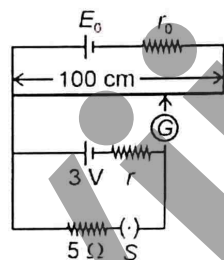
29. An electric dipole is placed in a uniform electric field with dipole axis making an angle θ with the direction of electric field. For dipole to be in unstable equilibrium, θ equals to

(1) π (2) $\frac{\pi}{2}$
(3) Zero (4) $\frac{\pi}{3}$

30. A hollow metal sphere of radius 5 cm is charged such that the potential on its surface becomes 50 V. The potential at the centre of the sphere is

(1) 40 V (2) 50 V
(3) Zero (4) 25 V

31. In the arrangement shown in figure, when the switch 'S' is opened, the galvanometer shows no deflection for $l = 60$ cm and when the switch is closed, the galvanometer shows no deflection for $l = 40$ cm. The internal resistance of the 3 V cell is



(1) $\frac{5}{3} \Omega$ (2) $\frac{5}{2} \Omega$
(3) $\frac{2}{5} \Omega$ (4) Zero

32. The resistance of a conductor at 20°C is 8Ω and at 80°C is 12Ω . The temperature coefficient of resistance of the conductor is nearly

(1) 0.001°C^{-1}
(2) 0.003°C^{-1}
(3) 0.01°C^{-1}
(4) 0.3°C^{-1}

33. Consider the following statements:

A. The magnetic field of several sources is the vector addition of magnetic field of each individual source.
B. A stationary charge can produce magnetic as well as electric field.
C. Ampere's circuital law and Biot Savart law, both express the relation between magnetic field and current.

The correct statement(s) is/are

(1) Only C (2) Only A and B
(3) Only A and C (4) A, B and C

34. A horizontal overhead power line carries a current of 80 A in north to south direction. The magnitude and direction of the magnetic field due to the current 2 m below the line

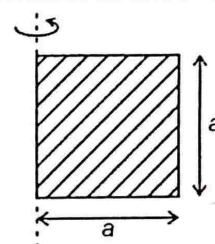
(1) $8\pi \mu\text{T}$, towards east (2) $8\pi \mu\text{T}$, towards west
(3) $8 \mu\text{T}$, towards east (4) $8 \mu\text{T}$, towards west

35. A short bar magnet of magnetic moment M , at distance r on its axis has magnetic field equal to

(1) $\frac{\mu_0 M}{4\pi r^3}$ (2) $\frac{2\mu_0 M}{\pi r^3}$
(3) Zero (4) $\frac{\mu_0 M}{2\pi r^3}$

SECTION - B

36. The moment of inertia of a square plate of mass m and side a about an axis as shown in figure is



(1) $\frac{ma^2}{3}$ (2) $\frac{2ma^2}{3}$
(3) $\frac{ma^2}{6}$ (4) $\frac{ma^2}{4}$

Space for Rough Work

37. Select the incorrect statements from the following:

- I. The orbital velocity of a satellite increases with the radius of the orbit.
- II. Escape velocity of a particle from the surface of the earth depends on its mass.
- III. The time period of a satellite does not depend on the radius of its orbit.
- IV. The orbital velocity is inversely proportional to the square root of the radius of the orbit.

- (1) I and II (2) I and IV
(3) I, II and IV (4) I, II and III

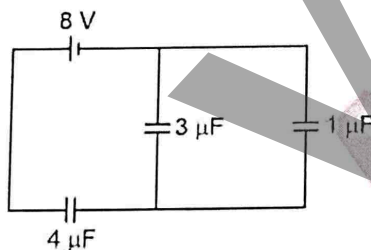
38. Which of the following data has minimum number of significant zeros?

- (1) 0.005005 (2) 0.002571
(3) 70.345 (4) 4.05

39. A body of mass 1 kg travelling with velocity $(2\hat{i} + \hat{j})$ m/s is given an impulse of $(6\hat{j})$ N s. The final velocity of body (in m/s) will be

- (1) $2\hat{i} + \hat{j}$ (2) $\hat{i} + 2\hat{j}$
(3) $2\hat{i} + 7\hat{j}$ (4) $7\hat{i} + 2\hat{j}$

40. The charge stored in $3 \mu\text{F}$ capacitor in the given circuit is



- (1) $4 \mu\text{C}$ (2) $8 \mu\text{C}$
(3) $10 \mu\text{C}$ (4) $12 \mu\text{C}$

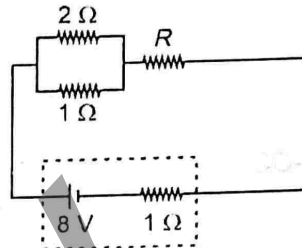
41. Electric field inside the cavity of uniformly charged sphere is

- (1) Non-uniform
(2) Uniform

(3) Zero

(4) Same as that on the surface of charged solid sphere

42. A network of resistors is connected to a 8 V battery with internal resistance of 1Ω . If the current through 2Ω resistor is 1 A, then terminal voltage of the battery is



- (1) 6 V (2) 8 V
(3) 5 V (4) 3 V

43. Hydrogen atom from excited state comes to the ground state by emitting a photon of wavelength λ_0 , then the principal quantum number of the excited state is (R is Rydberg constant)

- (1) $\sqrt{\frac{\lambda_0 R - 1}{\lambda_0 R}}$
(2) $\sqrt{\frac{\lambda_0}{\lambda_0 - 1}}$
(3) $\sqrt{\frac{\lambda_0 R}{\lambda_0 R - 1}}$
(4) $\sqrt{\frac{\lambda_0}{\lambda_0 R - 1}}$

44. A half-wave rectifier is used to convert ' n ' Hz a.c into d.c, then the number of pulses per second present in the rectified voltage is

- (1) n
(2) $n/2$
(3) $2n$
(4) $4n$

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CST-8 (Code-A)

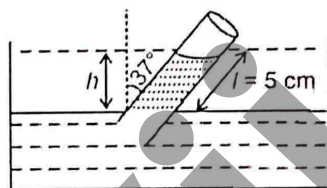
45. The minimum distance between a real object and its real image for concave mirror (focal length f) is

(1) $4f$
 (2) $2f$
 (3) Zero
 (4) f

46. In YDSE, if white light is used instead of a monochromatic light then

(1) The contrast between light and dark fringes will be more prominent
 (2) The central fringe will become completely dark
 (3) The bright fringes will become dark and dark ones will become bright
 (4) Fringes of different colours will be observed

47. A capillary tube dipped in a liquid is tilted as shown in figure and length of liquid in capillary tube is 5 cm. The value of h is



(1) 3 cm
 (2) 5 cm
 (3) 4 cm
 (4) 2 cm

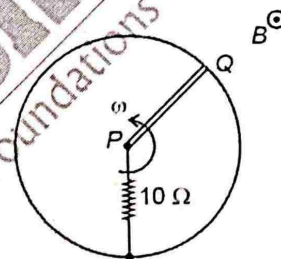
48. A metal rod 4 m long has a circular cross-section of radius 1 cm. One end is kept at 100°C and the other at 20°C , then the temperature at 50 cm from the hot end would be (thermal conductivity of metal is $401 \text{ W m}^{-1} \text{ K}^{-1}$)

(1) 87.5°C
 (2) 30°C
 (3) 90°C
 (4) 40°C

49. A series RLC circuit, driven with $V = 200 \text{ V}$ at frequency 50 Hz , contains an inductance with $X_L = 50 \Omega$ and a capacitance with $X_C = 60 \Omega$ and an unknown resistance R . If power factor is 0.8 , then power consumed in the circuit is

(1) 1200 W
 (2) 1920 W
 (3) 1800 W
 (4) 3600 W

50. A rod PQ of length 0.5 m and resistance 10Ω rotates about one end with angular velocity 10 rad/s as shown in figure. Its other end touches a conducting ring of negligible resistance. Another resistance of 10Ω is connected between centre and periphery. If there is uniform magnetic field $B = 0.1 \text{ T}$ exist in the space perpendicular to plane of the ring, then current flowing in the rod is



(1) $\frac{1}{40} \text{ A}$
 (2) $\frac{1}{80} \text{ A}$
 (3) $\frac{1}{160} \text{ A}$
 (4) $\frac{1}{240} \text{ A}$

Space for Rough Work

BOTANY

SECTION - A

51. Which one of the following algae shows diplontic life cycle?
 (1) *Volvox* (2) *Spirogyra*
 (3) *Chlamydomonas* (4) *Fucus*
52. State true (T) or false (F) for the given statements and choose the correct option.
 (a) Double fertilization is an event unique to angiosperms.
 (b) Coralloid roots show symbiotic association with *Rhizobium* for N_2 -fixation.
 (c) Winged pollen grains are found in *Pinus*.
- | a | b | c |
|-------|---|---|
| (1) F | T | F |
| (2) F | F | T |
| (3) T | T | F |
| (4) T | F | T |
53. Select the incorrectly matched pair.
 (1) Swiss cheese – *Propionibacterium sharmanii*
 (2) Penicillin – *Penicillium notatum*
 (3) Cyclosporin A – *Trichoderma polysporum*
 (4) Statins – *Candida lipolytica*
54. Which of the following statements is incorrect?
 (1) The process of maintaining the constancy of internal environment in the organisms is called homeostasis.
 (2) A stage of suspended development in the organisms during stressful conditions is called diapause.
 (3) Thick-walled spores are formed in bacteria, fungi, and lower plants (algae) to overcome unfavourable conditions.
 (4) Majority of animals and nearly all plants can maintain constant internal environment.
55. Release of inorganic substances like CO_2 , H_2O and minerals from organic matter or humus during the process of decomposition is called
 (1) Mineralisation (2) Catabolism
 (3) Humification (4) Leaching
56. In which one of the following options the two taxa given are correctly matched with their organisms?
- | Taxa | Organism |
|--|------------|
| (1) <i>Triticum</i> and Convolvulaceae | – Wheat |
| (2) Diptera and Canidae | – Housefly |
| (3) <i>Musca</i> and Anacardiaceae | – Mango |
| (4) Chordata and Hominidae | – Man |
57. Read the following statements (a-d).
 (a) Cell wall is generally made up of amino acids and sugars.
 (b) Membrane bound organelles are absent.
 (c) Nucleoid or incipient nucleus is composed of naked DNA, RNA and non-histone proteins.
 (d) Majority are heterotrophs, i.e., they depend on other organisms or on dead organic matter for food.
- Regarding five kingdom classification, the given features are most likely associated with the kingdom
 (1) Monera
 (2) Protista
 (3) Algae
 (4) Fungi
58. All of the given prokaryotes have different cell wall structures as compared to normal bacteria, except
 (1) *Methanobacterium* (2) *Thermoplasma*
 (3) *Thermoproteus* (4) *Clostridium*

Space for Rough Work

59. Which floral structure is usually colourful and responsible for attracting insects for pollination?
 (1) Calyx (2) Androecium
 (3) Corolla (4) Bracts
60. Find the **incorrect** match w.r.t. Placentation.
 (1) Axile – China rose
 (2) Basal – Sunflower
 (3) Free central – *Argemone*
 (4) Parietal – Mustard
61. How many of the given plants belong to Fabaceae?
Gloriosa, brinjal, *Aloe*, *Indigofera*, *Asparagus*, belladonna, groundnut, arhar, mustard, moong, mulathi, *Petunia*, tobacco, sunhemp
 (1) Six (2) Eight
 (3) Seven (4) Five
62. All of the following cells at maturity have nucleus, **except**
 (1) Sieve tubes (2) Slime moulds
 (3) White blood cells (4) Fungal cells
63. Match the Column I and Column II and select the correct option.
- | Column I | Column II |
|-------------------------------------|---------------------|
| (a) SER | (i) Nucleus |
| (b) Lysosome | (ii) Detoxification |
| (c) Nucleoid | (iii) Suicidal bags |
| (d) Chromatin material | (iv) Bacteria |
| (1) a-(ii), b-(iii), c-(iv), d-(i) | |
| (2) a-(iii), b-(ii), c-(i), d-(iv) | |
| (3) a-(iv), b-(ii), c-(iii), d-(i) | |
| (4) a-(i), b-(iii), c-(iii), d-(iv) | |
64. Which layer of cell envelope in prokaryotes prevents them from bursting or collapsing?
 (1) Capsule (2) Cell membrane
 (3) Slime layer (4) Cell wall
65. Four microspore mother cells after meiotic division in angiosperms will form
 (1) 8 microspores
 (2) 4 microspores
 (3) 16 microspore tetrads
 (4) 4 microspore tetrads
66. Meiosis I is the actual reductional division where the reduction in chromosome number occurs at
 (1) Anaphase I (2) Prophase I
 (3) Metaphase I (4) Telophase I
67. Shortest phase of a typical cell cycle among the following is
 (1) Interphase (2) M-phase
 (3) G₂-phase (4) G₁-phase
68. Which of the following cells help in maintaining pressure gradient in sieve tubes?
 (1) Bulliform cells (2) Companion cells
 (3) Subsidiary cells (4) Lenticels
69. Read the following statements and select the **correct** option.
Assertion (A): Heartwood is durable, hard and resistant to attack of microbes and insects.
Reason (R): Heartwood present in the peripheral region of the stem has deposition of organic compounds like resins, tannins, gums and aromatic substances.
 (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (3) (A) is true but (R) is false
 (4) Both (A) and (R) are false
70. Different pathways are followed by the plants in response to environment or phases of life to form different kinds of structures. This ability is called
 (1) Plasticity (2) Vernalisation
 (3) Photoperiodism (4) Development

Space for Rough Work

71. Inner layer of cell wall of pollen grain is made up of
 (1) Sporopollenin (2) Cellulose and pectin
 (3) Cellulose only (4) Pectin only
72. In the light of given statements, choose the correct answer from the options given below:
Statement I: If the female parent bears unisexual flowers then emasculation is required.
Statement II: Process of bagging is not necessary for the emasculated flowers to prevent contamination of its stigma.
 (1) Only statement I is correct
 (2) Only statement II is correct
 (3) Both statements I and II are correct
 (4) Both statements I and II are incorrect
73. Match column-I with column-II and select the correct option.
- | Column-I | Column-II |
|------------------------|---|
| (a) Maurice Wilkins | (i) DNA fingerprinting technique |
| (b) Taylor | (ii) Semiconservative nature of DNA replication |
| (c) Marshall Nirenberg | (iii) X-ray diffraction data of DNA |
| (d) Alec Jeffreys | (iv) Cell-free system for protein synthesis |
- (1) a-(iii), b-(ii), c-(iv), d-(i)
 (2) a-(i), b-(iv), c-(ii), d-(iii)
 (3) a-(ii), b-(iv), c-(iii), d-(i)
 (4) a-(iii), b-(i), c-(iv), d-(ii)
74. Histone proteins
 (1) Are required for gene expression
 (2) Are of 7 types
 (3) Are organised to form nucleoid
 (4) Contains basic amino acids
75. Read the following statements and select the correct option.
Statement A: Split gene arrangement is characteristic of all prokaryotes.
Statement B: The coding strand in a transcription unit of DNA is used as a template to form an mRNA.
 (1) Only statement A is correct
 (2) Only statement B is correct
 (3) Both the statements A and B are correct
 (4) Both the statements A and B are incorrect
76. Which of the following DNA sequences leads to the formation of given mRNA?
 5'-UACGUACGUACGUAC-3'
 (1) 3'-ATGCATGCATGCATG-5'
 (2) 3'-GATCGATCGATCGAT-5'
 (3) 3'-TACGTACGTACGTAC-5'
 (4) 3'-TACGTACGTACTACC-5'
77. The plants that show Kranz anatomy, also
 (1) Lack RuBisCO enzyme in their bundle sheath cell
 (2) Have primary CO₂ acceptor as 4C ketose sugar
 (3) Form phosphoglycolate during CO₂ fixation
 (4) Show decarboxylation in bundle sheath cells
78. External electron donor used during non-cyclic photophosphorylation is
 (1) H₂O (2) PQ
 (3) Plastocyanin (4) Cyt b₆f complex
79. In the typical Mendelian monohybrid cross, law of dominance is used to explain
 (1) The expression of both the parental characters in the F₁ generation
 (2) The purity of gametes
 (3) The expression of only one of the parental characters in the F₂ generation
 (4) The proportion of 3 : 1 phenotypes obtained at the F₂ generation

Space for Rough Work

CST-8 (Code-A)

80. Chromosomal complement $44 + XXY$ results in which type of disorder in humans?
- (1) Turner's syndrome
 - (2) Klinefelter's syndrome
 - (3) Edwards syndrome
 - (4) Down's syndrome

81. How many true breeding pea plant varieties were selected by Mendel for his experiment?

- (1) Seven
- (2) Sixteen
- (3) Two
- (4) Fourteen

82. Match the Column I with Column II and choose the correct option.

	Column I		Column II
(a)	Nullisomic condition	(i)	$2n + 1$
(b)	Trisomic condition	(ii)	$2n + 2$
(c)	Monosomic condition	(iii)	$2n - 2$
(d)	Tetrasomic condition	(iv)	$2n - 1$

- | | | | |
|-----------|-------|------|------|
| (a) | (b) | (c) | (d) |
| (1) (iv) | (iii) | (i) | (ii) |
| (2) (iii) | (i) | (iv) | (ii) |
| (3) (ii) | (iii) | (iv) | (i) |
| (4) (iii) | (iv) | (i) | (ii) |

83. Oxidative decarboxylation of pyruvic acid

- (1) Is catalysed by lactate dehydrogenase
- (2) Takes place in cytosol of eukaryotic cells
- (3) Does not require Mg^{2+} for reaction
- (4) Involves release of CO_2

84. Which among the following "Evil Quartet" regarding biodiversity loss exemplifies cutting and clearing of Amazon rain forest for soyabean cultivation?

- (1) Over exploitation
- (2) Alien species invasion
- (3) Habitat loss and fragmentation
- (4) Co-extinction

85. Read the following statements and choose the correct option.

Statement I: Biodiversity hotspots have high degree of endemism.

Statement II: Indo-Burma, Himalayas and Western ghats are sacred groves in India considered as *ex-situ* conservation strategy.

- (1) Only statement I is correct
- (2) Only statement II is correct
- (3) Both statements I and II are correct
- (4) Both statements I and II are incorrect

SECTION - B

86. Algin and carrageen are hydrocolloids that are obtained from ____ and ____ algae respectively.

- (1) Green and Red
- (2) Red and Green
- (3) Brown and Red
- (4) Red and Brown

87. The technology of biogas production was developed in India mainly due to the efforts of

- (1) IARI and KVIC
- (2) ICAR and KVIC
- (3) IUCN and MAB
- (4) UNESCO

88. Read the following statements and select the correct option.

Statement A: Niche of an organism represents the range of conditions that it can tolerate, the resources it utilises and its functional role in ecological system.

Statement B: In mycorrhiza, the interacting species exemplify commensalism.

- (1) Both statements A and B are correct
- (2) Only statement A is correct
- (3) Only statement B is correct
- (4) Both statements A and B are incorrect

Space for Rough Work

89. Which one of the following is the most limiting nutrient of marine ecosystem?
- (1) Phosphorus (2) Nitrogen
(3) Carbon (4) Sulphur
90. Read the following statements for a group of photosynthetic protists.
- Statement A:** Most of them have two flagella; one lies longitudinally and the other transversely in a furrow between the wall plates.
- Statement B:** Very often, they undergo rapid multiplication cause red tides of sea.
- Choose the **correct** option w.r.t. the given statements A and B.
- (1) Both statements A and B are correct for diatoms
(2) Only statement B is correct for Chrysophytes
(3) Only statement A is correct for Dinoflagellates
(4) Both statements A and B are correct for Dinoflagellates
91. Select the **correct** option w.r.t. region of root tip which is present a few millimetres above the root cap.
- (1) Cells undergo rapid elongation and enlargement and are responsible for the growth of the root in length.
(2) The cells of this region gradually differentiate and mature.
(3) The cells of this region are very small, thin-walled and with dense protoplasm.
(4) From this region some of the epidermal cells form very fine and delicate, thread-like structures called root hairs.
92. Read the following statements and choose the **correct** option.
- Statement A:** Middle lamella holds the different neighbouring plant cells.
- Statement B:** Ripening of fruits is due to solubilization of pectate compounds of middle lamella.
- (1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements are correct
(4) Both statements are incorrect
93. Cell cycle is divided into two basic phases, known as
- (1) G₁ and S phases
(2) Interphase and M phase
(3) S and G₂ phases
(4) G₁ and M phases
94. Identify the **incorrect** statement(s) about the anatomical features of monocot stem and choose the option accordingly.
- (a) Xylem and phloem are jointly situated along the same radius of vascular bundles, and cambium is present in between xylem and phloem.
(b) Vascular bundles which are present at the periphery are generally larger than the centrally located ones.
(c) Hypodermis is sclerenchymatous and water containing cavities are present within the pith.
(d) Large, conspicuous parenchymatous ground tissue is absent.
- (1) b, c and d only
(2) c only
(3) All a, b, c and d
(4) a and b only
95. Select the **incorrectly** matched pair.
- (1) Short day plant – Tobacco
(2) Day neutral plant – Cucumber
(3) Biennial plant – Cabbage
(4) Long day plant – Soyabean

Space for Rough Work

96. Read the following statements and state **true (T)** or **false (F)** to the given statements.

- (a) During megasporogenesis, megaspore mother cell undergoes mitosis and forms linear tetrad of four haploid megaspores.
- (b) Megaspore mother cell is a large cell which contains prominent nucleus and dense cytoplasm.
- (c) Ovules generally differentiate a single megaspore mother cell in the chalazal region of the nucellus.
- (d) Within the embryo sac, egg apparatus consists of two synergids and one egg cell.
- (e) A typical embryo sac of an angiosperm at maturity is 8-nucleate and 7-celled.

Choose the **correct** option.

- | (a) | (b) | (c) | (d) | (e) |
|-------|-----|-----|-----|-----|
| (1) T | F | T | T | F |
| (2) F | F | F | T | T |
| (3) T | T | T | F | T |
| (4) F | T | F | T | T |

97. Which of the following techniques is **not** utilized during DNA fingerprinting?

- (1) PCR
- (2) X-ray crystallography

- (3) Autoradiography
- (4) Southern blotting

98. By using heavy nitrogen (^{15}N) in *E. coli*, who performed the experiment which suggests that DNA replication is semiconservative?

- (1) Nirenberg
- (2) Taylor
- (3) Hershey
- (4) Matthew Meselson and Franklin Stahl

99. In a typical dihybrid Mendelian experiment, what is the probability of plants which are homozygous for only one trait in the F_2 generation?

- | | |
|-------------------|--------------------|
| (1) $\frac{3}{8}$ | (2) $\frac{9}{16}$ |
| (3) $\frac{1}{2}$ | (4) $\frac{1}{4}$ |

100. FMN-FeS are associated with which complex in mitochondrial ETS?

- (1) Complex IV
- (2) Complex I
- (3) Complex II
- (4) Complex III

ZOOLOGY

SECTION - A

101. In the restriction enzyme *EcoRI*, 'co' stands for

- (1) Co-factor
- (2) *coli*
- (3) Co-enzyme
- (4) Colon

102. The linking of a foreign gene with the plasmid vector became possible due to

- (1) Exonucleases
- (2) RNases
- (3) DNA ligases
- (4) Endonucleases

103. Approximately, how many testicular lobules are present in the testes of a healthy human?

- (1) 250
- (2) 500
- (3) 750
- (4) 1500

104. In Green Revolution, increased yields of crops have partly been due to the

- (1) Conventional breeding methods
- (2) Use of better management practices
- (3) Use of improved crop varieties
- (4) Use of agrochemicals

Space for Rough Work

105. The electrical potential difference across the resting plasma membrane of a neuron is called
 (1) Resting potential
 (2) Action potential
 (3) Nerve impulse
 (4) Stimulus
106. Pneumatic bones are present in
 (1) *Salpa* (2) *Myxine*
 (3) *Calotes* (4) *Pavo*
107. Enzymes that catalyse the removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds are
 (1) Hydrolases (2) Lyases
 (3) Transferases (4) Ligases
108. If the total amount of adenine is 20% and cytosine is 30% in a double stranded DNA, then calculate the total % of pyrimidine in the sample and choose the correct option.
 (1) 20% (2) 30%
 (3) 50% (4) 60%
109. The per cent of CO₂ carried by haemoglobin as carbamino – haemoglobin in humans is approximately equal to the per cent of
 (1) Electrolytes and water reabsorbed by PCT
 (2) Body weight of human adults contributed by muscles
 (3) Endocrine part of pancreas
 (4) Lymphocytes in total white blood cells of an adult human
110. Comprehend the features given below:
 a. Worm-like marine invertebrate
 b. Presence of notochord
 c. Exhibits branchial respiration
 d. Dioecious in nature
 e. Kidneys for excretion
 Select the **correct** option w.r.t. *Balanoglossus*.
 (1) a, b and c (2) b, c and d
 (3) a, c and e (4) a, c and d
111. Which of the following is the critical research area of biotechnology?
 (1) Providing the best catalyst in the form of unimproved organism usually a microbe or pure biocatalyst
 (2) Creating optimal conditions through agriculture for a catalyst to act
 (3) Downstream processing technologies to purify the protein / organic compound
 (4) Upstream processing technologies for marketing the product or medicine
112. The kind of epithelium present in bronchi and affected in asthma is
 (1) Squamous epithelium
 (2) Ciliated epithelium
 (3) Brush bordered epithelium
 (4) Compound epithelium
113. Organisms of phylum 'P' are characterised by the presence of circulatory system and absence of respiratory system. Choose the **correct** option for 'P'.
 (1) Arthropoda (2) Annelida
 (3) Coelenterata (4) Porifera
114. Match column I with column II and select the most appropriate option.
- | Column I | Column II |
|------------------|--|
| a. Progestasert | (i) Terminal method of contraception |
| b. Saheli | (ii) Phagocytosis of sperms |
| c. Implants | (iii) Once a week pill |
| d. Sterilisation | (iv) Alter the quality of cervical mucus |
- (1) a(iv), b(iii), c(ii), d(i) (2) a(iii), b(i), c(ii), d(iv)
 (3) a(ii), b(iii), c(iv), d(i) (4) a(i), b(iv), c(iii), d(ii)

Space for Rough Work

CST-8 (Code-A)

115. A regulatory centre present in 'X' region of the hindbrain of humans can moderate the functions of 'Y' present in the 'Z' part of the brain stem. Identify 'Y' and 'Z' respectively and select the correct option.
- Respiratory rhythm centre; medulla oblongata
 - Pneumotaxic centre; pons varolii
 - Respiratory rhythm centre; pons varolii
 - Pneumotaxic centre; medulla oblongata
116. All of the following contraceptive methods have negligible side effects but their chances of failure are high, **except**
- Lactational amenorrhea
 - Vasectomy
 - Periodic abstinence
 - Coitus interruptus
117. During gel electrophoresis, the DNA fragments get separated from each other as
- They are negatively charged molecules.
 - They are forced to move towards cathode.
 - Their movement is dependent on the size of DNA fragments.
 - They retain their quaternary structure.
118. Select the **incorrect** statement w.r.t. frogs.
- The most common species found in India is *Rana tigrina*.
 - Body is divisible into head and trunk.
 - Their forebrain includes paired diencephalon.
 - They possess sensory papillae as sense organ.
119. Select the **correct** match.
- | Component | % of the cellular mass |
|-------------------|------------------------|
| (1) Water | – 70-90 |
| (2) Lipids | – 3 |
| (3) Nucleic acids | – 1 |
| (4) Ions | – 10-15 |
120. Consider the properties/features listed below w.r.t diaphragms and vaults.
- They are reusable.
 - Spermicidal creams or jellies are used along with them to decrease their contraceptive efficiency.
 - They are made of rubber and are inserted into the female reproductive tract to cover the cervix during coitus.
- Select the option containing **correct** feature(s) only.
- (a) and (b)
 - (a) and (c)
 - (b) only
 - (c) only
121. Match the Column I with Column II. Select the most appropriate option.
- | Column I | Column II |
|------------------------------|--------------------|
| a. Exclusively marine phylum | (i) Mollusca |
| b. Phylum of insects | (ii) Arthropoda |
| c. Second largest phylum | (iii) Ctenophora |
| d. Phylum of sea walnuts | (iv) Echinodermata |
- (1) a(iii), b(ii), c(iv), d(i) (2) a(iv), b(iii), c(ii), d(i)
 (3) a(iii), b(i), c(ii), d(iv) (4) a(iv), b(ii), c(i), d(iii)
122. The hepatic portal vein carries blood from intestine to the liver and from liver, blood is first delivered to
- Pulmonary circulation
 - Lymphatic circulation
 - Systemic circulation
 - Coronary circulation

Space for Rough Work

123. The oral administration of insulin is not prescribed by the doctors, as
- (1) Insulin is a proteinaceous hormone and it gets easily digested by the digestive enzymes.
 - (2) Insulin harms the mucosa of GIT.
 - (3) Oral administration of insulin have many side effects.
 - (4) Insulin tablets are made of cellulose and digestive enzymes for cellulose are absent in humans.
124. Read the following statements about vaccination.
- (a) Hepatitis-B vaccine was produced from yeast.
 - (b) Small pox is not completely eradicated by vaccination.
- Select the **correct** option.
- (1) Both statements (a) and (b) are correct
 - (2) Only statement (a) is correct
 - (3) Both statements (a) and (b) are incorrect
 - (4) Only statement (b) is correct
125. Select the **incorrect** match.
- (1) Starch – Can hold I_2 molecules
 - (2) Cellulose – Contains complex helices
 - (3) Non-essential amino acids – Can be produced by our body
 - (4) Adenine – Substituted purine
126. Read the following statements carefully and select the **correct** option.
- Statement A:** Correction of a genetic defect involves delivery of a normal gene into the individual or embryo to take over the function of and compensate for the non-functional gene.
- Statement B:** The first clinical gene therapy was given in 1999 to a 14-year-old girl with ADA deficiency.
- (1) Only statement A is correct
 - (2) Both statements A and B are correct
 - (3) Both statements A and B are incorrect
 - (4) Only statement B is correct
127. The total number of all of the given bones in humans is equal to six, **except**
- (1) Ear ossicles
 - (2) Girdle bones
 - (3) Vertebrochondral ribs
 - (4) Lumbar vertebrae
128. Which of the following are ancestors of crocodiles?
- (1) Thecodonts
 - (2) Therapsids
 - (3) Synapsids
 - (4) Pelycosaurs
129. Rejection of organ transplantation is primarily mediated by
- (1) Thrombocytes
 - (2) B-lymphocytes
 - (3) T-lymphocytes
 - (4) Antibodies
130. Select the hormone that interacts with membrane bound receptors and normally do not enter the target cell but generates second messengers.
- (1) Estradiol
 - (2) Cortisol
 - (3) Thyroxine
 - (4) Glucagon
131. Which of the following separates the left and the right atria in humans heart?
- (1) A thin muscular septum
 - (2) A thick fibrous septum
 - (3) A thin fibrous septum
 - (4) A tract of nerve fibres
132. Which of the following is true for Bt toxin?
- (1) It is an exotoxin and is released to the outside through body of insects.
 - (2) It is not digested in human gut but digested in insects.
 - (3) Insects ingest Bt toxins always in active forms.
 - (4) Its presence in Bt cotton results in decreased consumption of chemical insecticides that are applied to cotton fields.

Space for Rough Work

CST-8 (Code-A)

133. Select the incorrect abbreviation from the following.

- (1) ANF : Atrial Natriuretic Factor
- (2) JGA : Juxta Glomerular Apparatus
- (3) ADH : Anti Diuretic Hormone
- (4) GFR : Glomerular Flow Rate

134. The disease caused by *Haemophilus influenzae* among the following is

- (1) AIDS
- (2) Ringworms
- (3) Gonorrhoea
- (4) Pneumonia

135. Select the incorrect statement for the enzyme used in PCR.

- (1) It is thermostable in nature.
- (2) It is isolated from *Thermus aquaticus*.
- (3) It gets denatured at a temperature just above 70°C.
- (4) It is used in the primer extension step.

SECTION-B

136. Match Column I with Column II and select the correct option w.r.t. humans.

Column I	Column II
a. Tibia and fibula	(i) Axial skeleton
b. Sternum and occipital condyle	(ii) Coxal bones
c. Clavicle and scapula	(iii) Appendicular skeleton
d. Pubis and ischium	(iv) Pectoral girdle

- (1) a(i), b(ii), c(iii), d(iv)
- (2) a(iii), b(i), c(iv), d(ii)
- (3) a(iv), b(iii), c(ii), d(i)
- (4) a(iii), b(iv), c(ii), d(i)

137. Read the following statements.

- a. Primary metabolites have identifiable functions and play important roles in normal physiology.
- b. Morphine and codeine are secondary metabolites that belong to the category of lectins.
- c. Secondary metabolites do not have important roles in normal physiology of the host.

Select the option that represents correct set of statements.

- (1) a and c
- (2) a, b and c
- (3) a and b
- (4) b and c

138. Complete the analogy w.r.t. glands and their location in humans.

Hypothalamus : _____ : : Pineal gland : Dorsal side of forebrain

- (1) Sella tursica
- (2) Basal part of diencephalon
- (3) Between lungs behind sternum
- (4) Anterior part of kidney

139. Choose the odd one w.r.t. components of rib cage in humans.

- (1) Sternum
- (2) Thoracic vertebrae
- (3) Lumbar vertebrae
- (4) Vertebrosteral ribs

140. Select the correct match.

(1) Industrial melanism	–	Evolution by anthropogenic action
(2) Australian marsupials	–	Convergent evolution
(3) Darwin's finches	–	Saltation
(4) Placental mammals of Australia	–	Cyclical evolution

Space for Rough Work

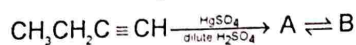
141. **Assertion (A):** Pulmonary circulation carries both oxygenated and deoxygenated blood.
Reason (R): It starts by the pumping of oxygenated blood by the right ventricle which is carried to the lungs where it is deoxygenated and returns to the left atrium.
 In the light of the above statements, select the correct option.
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (A) is true but (R) is false
 - Both (A) and (R) are false
142. All of the following cells are present outside the seminiferous tubules in human testes, **except**
- Interstitial cells
 - Leydig cells
 - Immunologically competent cells
 - Sertoli cells
143. Which of the following structures in human male opens into urethra and transports the sperms to the outside through urethra?
- Epididymis
 - Vas deferens
 - Ejaculatory duct
 - Vasa efferentia
144. Consider the given statements and choose the **incorrect** one.
- Variation due to mutation results in changed frequency of genes and alleles in future generation.
 - An important evidence in favour of organic evolution is the occurrence of homologous and vestigial organs.
 - Fitness is the end result of the ability to adapt and get selected by nature.
 - Variation in gene frequencies within populations can occur by chance rather than by natural selection. This is called genetic flow.
145. A chemical synapse does not include
- Pre-synaptic membrane
 - Post-synaptic membrane
 - Synaptic vesicles
 - Synaptic cleft
146. In some children, ADA deficiency can be cured by bone marrow transplantation; in others it can be treated by
- Vaccines
 - Enzyme replacement therapy
 - Chemotherapy
 - Radiotherapy
147. If in a hypothetical scenario, a gene encoding for β -galactosidase is inserted in the pBR322 using the enzyme *Sal* I and the recombinant plasmid is inserted in *E. coli*, then
- The recombinant host organism will show the resistance towards the tetracycline
 - The transformed recombinant colonies will give blue colour in the presence of a chromogenic substrate
 - The non-recombinants will be resistant to the kanamycin
 - All the transformants will die in the presence of ampicillin
148. Select the **incorrect** match.
- Planaria* – High regeneration capacity
 - Meandrina* – Calcified exoskeleton
 - Fasciola* – Protonephridia for excretion
 - Adamsia* – Exhibits alternation of generation
149. The epithelium present in tubular part of nephrons is
- Cuboidal epithelium
 - Columnar epithelium
 - Ciliated epithelium
 - Compound epithelium
150. Read the given statements and select the **correct** option w.r.t. earthworm.
- Statement A:** The dorsal surface of their body is distinguished by the presence of genital openings.
Statement B: Their body is divisible into 3 regions-preclitellar, clitellar and postclitellar.
- Both statements A and B are correct
 - Both statements A and B are incorrect
 - Only statement A is correct
 - Only statement B is correct

Space for Rough Work

CHEMISTRY

SECTION - A

151. Predict the correct product A and major product B in the following reaction.



(1) A : $\text{CH}_3\text{CH}_2-\text{CH}=\text{CH}-\text{OH}$

B : $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$

(2) A : $\text{CH}_3-\text{CH}_2-\overset{\text{OH}}{\underset{\text{O}}{\text{C}}}=\text{CH}_2$

B : $\text{CH}_3\text{CH}_2-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{CH}_3$

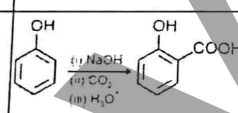
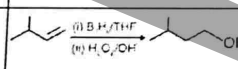
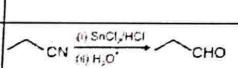
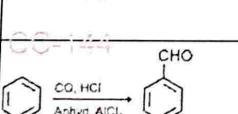
(3) A : $\text{CH}_3\text{CH}=\overset{\text{OH}}{\underset{\text{O}}{\text{C}}}-\text{CH}_3$

B : $\text{CH}_3-\text{CH}_2-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{CH}_3$

(4) A : $\text{CH}_3\text{CH}_2-\overset{\text{OH}}{\underset{\text{OH}}{\text{C}}}=\text{CH}$

B : $\text{CH}_3\text{CH}_2-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{C}-\text{H}$

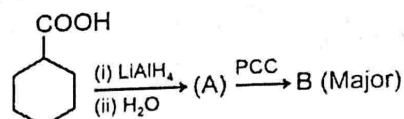
152. Match the reactions given in column I with the name associated given in column II and choose the correct answer.

	Column I		Column II
a.		(i)	Gatterman-Koch reaction
b.		(ii)	Stephen reaction
c.		(iii)	Kolbe's reaction
d.		(iv)	Hydroboration-oxidation reaction

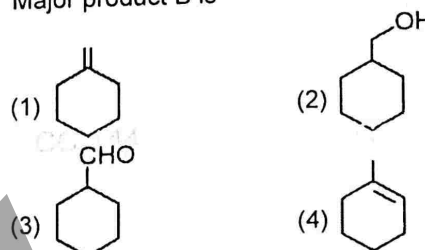
(1) a(iii), b(iv), c(i), d(ii) (2) a(iii), b(iv), c(ii), d(i)

(3) a(iv), b(iii), c(ii), d(i) (4) a(iv), b(iii), c(i), d(ii)

153. Consider the following reaction sequence



Major product B is



154. Consider the following statements

- Histidine is an essential amino acid.
- Myosin is an example of globular protein.
- During denaturation of protein, primary structure remains intact.

The correct statements are

- (1) a and b only (2) b and c only
(3) a and c only (4) a, b and c

155. Match column I with column II.

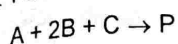
	Column I		Column II
a.	Antiaromatic compound	(i)	1,3,5,7-Cyclooctatetraene
b.	Heterocyclic aromatic compound	(ii)	Aniline
c.	Benzenoid aromatic compound	(iii)	Pyrrole
d.	Nonaromatic compound	(iv)	1,3-Cyclobutadiene

The correct match is

- (1) a(iv), b(iii), c(i), d(ii) (2) a(ii), b(iii), c(iv), d(i)
(3) a(iii), b(iv), c(ii), d(i) (4) a(iv), b(iii), c(ii), d(i)

Space for Rough Work

156. For the reaction



The proposed mechanism is

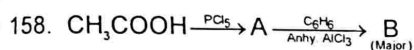
- i. $A + B \rightleftharpoons D$ (fast)
- ii. $D + C \rightarrow E$ (slow)
- iii. $E + B \rightarrow P$ (fast)

Order of reaction with respect to A, B and C respectively are

- (1) 0, 1, 2
- (2) 1, 2, 1
- (3) 2, 1, 1
- (4) 1, 1, 1

157. Which of the following will give fastest nucleophilic addition reaction?

- (1) HCHO
- (2) CH₃CHO
- (3) C₆H₅CHO
- (4) CH₃COCH₃



Product B in given reaction is

- (1)
- (2)
- (3)
- (4)

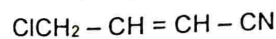
159. Working pH range of methyl orange indicator is

- (1) 3.1 to 4.5
- (2) 4.2 to 6.2
- (3) 6.2 to 8.2
- (4) 8.2 to 10.2

160. Fe³⁺ ions give blood red colour when added with

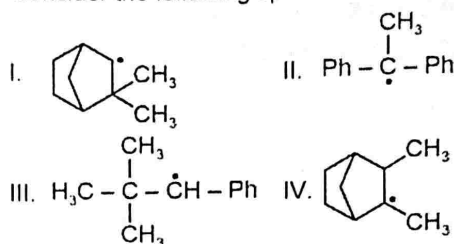
- (1) NaSCN
- (2) AgNO₃
- (3) BaCl₂
- (4) K₂Hgl₄

161. The hybridisation shown by C₁ and C₂ carbon atoms, respectively in the given compound are



- (1) sp³ and sp²
- (2) sp and sp²
- (3) sp³ and sp
- (4) sp and sp³

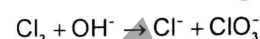
162. Consider the following species



Hyperconjugation occurs in

- (1) I and II only
- (2) II and III only
- (3) II, III and IV only
- (4) II and IV only

163. Consider the following redox reaction



If 2 mol of Cl₂ reacts with an alkali (OH⁻) then the total number of moles of ClO₃⁻ ions produced is

- (1) 1 mol
- (2) 1.5 mol
- (3) 0.667 mol
- (4) 0.33 mol

164. Choose the incorrect statement:

- (1) Oxidation number of sulphur in tetrathionate ion is fractional
- (2) The central carbon atom in carbon suboxide is in zero oxidation state
- (3) In CrO₅, there are three peroxide linkages
- (4) Fe₃O₄ is a mixed oxide

165. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R):

Assertion (A): Silicon dioxide in its normal form is almost non-reactive.

Reason (R): The bond enthalpy of Si - O bond is very high.

In the light of the above statements, choose the correct answer from the options given below:

- (1) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
- (2) (A) is true but (R) is false
- (3) (A) is false but (R) is true
- (4) Both (A) and (R) are true and (R) is the correct explanation of (A)

Space for Rough Work

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166. The possible set of four quantum numbers for the valence electron of Gallium atom ($Z = 31$) is
- (1) 4, 2, 0, $+\frac{1}{2}$
 - (2) 5, 1, 0, $+\frac{1}{2}$
 - (3) 4, 1, 1, $-\frac{1}{2}$
 - (4) 3, 1, -1, $+\frac{1}{2}$
167. Given below are two statements
- Statement I:** Phosphoric acid disproportionates to give phosphorous acid and phosphine.
- Statement II:** Phosphinic acid is a monoprotic acid while phosphonic acid is a diprotic acid.
- In the light of the above statements, choose the correct answer from the options given below:
- (1) Statement I is true but Statement II is false
 - (2) Statement I is false but Statement II is true
 - (3) Both Statement I and Statement II are true
 - (4) Both Statement I and Statement II are false
168. When copper is reacted with dilute HNO_3 it produces
- (1) $\text{Cu}(\text{NO}_3)_2$, NO, N_2O and H_2O
 - (2) $\text{Cu}(\text{NO}_3)_2$, N_2O and H_2O
 - (3) $\text{Cu}(\text{NO}_3)_2$, NO_2 and H_2O
 - (4) $\text{Cu}(\text{NO}_3)_2$, NO and H_2O
169. The bond order of 2.5 is shown by
- (1) O_2^{2-}
 - (2) O_2
 - (3) O_2^+
 - (4) O_2^-
170. Which of the following molecules will have permanent dipole moment?
- (1) SF_4
 - (2) BF_3
 - (3) SiF_4
 - (4) XeF_4
171. Given below are two statements:
- Statement I:** Solubility of a gas increases with increase in pressure of gas above liquid.
- Statement II:** Solubility of a gas increases with increase in temperature.
- In the light of the above statements, choose the correct answer from the options given below:
- (1) Both Statement I and Statement II are true
 - (2) Statement I is true but Statement II is false
 - (3) Statement I is false but Statement II is true
 - (4) Both Statement I and Statement II are false
172. The weight of urea required to be dissolved in 360 g water to reduce the vapour pressure to $\frac{9}{10}$ of pure water is
- (1) 133.33 g
 - (2) 266.7 g
 - (3) 180 g
 - (4) 150 g
173. Which one of the following pairs of gases contain the same number of molecules?
- (1) 28 g of N_2 and 16 g of O_2
 - (2) 16 g of O_2 and 14 g of N_2
 - (3) 32 g of O_2 and 7 g of N_2
 - (4) 8 g of O_2 and 14 g of N_2
174. Boron has two stable isotopes ^{10}B (19%) and ^{11}B (81%). The average atomic mass of Boron is
- (1) 10.8 u
 - (2) 10.2 u
 - (3) 10.5 u
 - (4) 10.4 u
175. $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$ and $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ are related as
- (1) Linkage isomers
 - (2) Coordination isomers
 - (3) Ionisation isomers
 - (4) Solvate isomers

Space for Rough Work

176. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R):

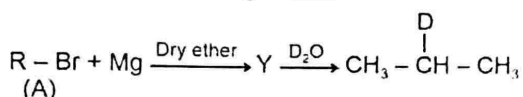
Assertion (A): Aniline does not undergo Friedel-Crafts reaction.

Reason (R): In Friedel-Crafts reaction, nitrogen of aniline in presence of AlCl_3 acquires positive charge and acts as a strong deactivating group.

Choose the correct option.

- (1) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
- (2) (A) is true but (R) is false
- (3) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (4) (A) is false but (R) is true

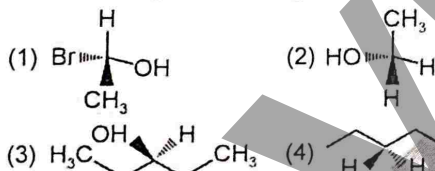
177. Consider the following reaction



The IUPAC name of compound A is

- (1) Bromoethane
- (2) 2-Bromopropane
- (3) 1-Bromobutane
- (4) 1-Bromopropane

178. Which among the following is a chiral molecule?



179. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R):

Assertion (A): Electron gain enthalpy of O is less negative than that of the succeeding element of same group.

Reason (R): Oxygen is most electronegative element in chalcogen family.

In the light of the above statements, choose the correct answer from the options given below:

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

180. Given below are two statements:

Statement I: The effective nuclear charge experienced by a valence electron in an atom will be less than the actual charge on the nucleus.

Statement II: As we move from lithium to fluorine, effective nuclear charge decreases.

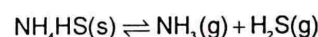
In the light of the above statements, choose the correct answer from the options given below:

- (1) Both Statement I and Statement II are correct
- (2) Both Statement I and Statement II are incorrect
- (3) Statement I is correct but Statement II is incorrect
- (4) Statement I is incorrect but Statement II is correct

181. If an external opposite potential greater than 1.1 V is applied in the galvanic cell, then

- (1) No chemical reaction takes place
- (2) Electrons flow from Zn rod to Cu rod
- (3) Zn dissolves at anode and copper deposits at cathode
- (4) Current flows from Zn to Cu

182. Consider the reaction,



If K_p of the reaction is 256 then the total pressure at equilibrium will be

- (1) 30 atm
- (2) 32 atm
- (3) 16 atm
- (4) 15 atm

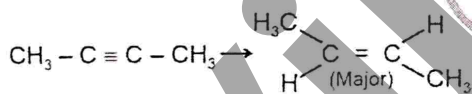
Space for Rough Work

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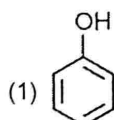
183. Which of the following pair constitutes a buffer solution?
- (1) $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$
 - (2) $\text{HCl} + \text{NaCl}$
 - (3) $\text{H}_2\text{SO}_4 + \text{Na}_2\text{SO}_4$
 - (4) $\text{Ba}(\text{OH})_2 + \text{BaCl}_2$
184. Identify the correct statement among the following.
- (1) Cr^{2+} is oxidising agent and Mn^{3+} is reducing agent
 - (2) Third ionisation energy of Mn is higher than Fe
 - (3) Cu^{2+} is less stable than Cu^+ in aqueous phase
 - (4) Zn has highest enthalpy of atomisation in 3d series
185. The reduction potential of hydrogen electrode in contact with a solution with pH = 7 is
- (1) -0.4137 V
 - (2) 0.4137 V
 - (3) -0.0591 V
 - (4) 0.0591 V

SECTION - B

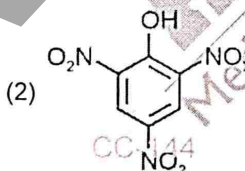
186. The most suitable reagent for the following conversion is



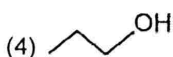
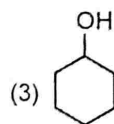
- (1) Zn/HCl
 - (2) $\text{H}_2, \text{Pd/C}, \text{quinoline}$
 - (3) Na/liquid NH_3
 - (4) NaBH_4
187. The compound which will evolve CO_2 on reaction with NaHCO_3 is



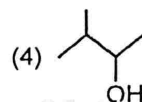
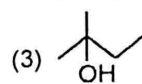
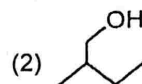
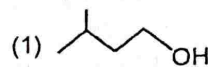
CC-144



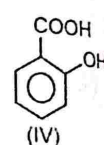
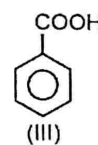
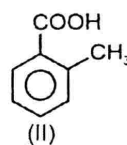
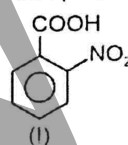
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188. Which among the following is dehydrated most easily in acidic medium?



189. Correct increasing order of acidic strength of given compounds is



- (1) (I) < (II) < (III) < (IV)
- (2) (III) < (II) < (IV) < (I)
- (3) (I) < (IV) < (II) < (III)
- (4) (III) < (I) < (IV) < (II)

190. The rate constant of reactant A for a reaction is 10^{-3} s^{-1} and rate of reaction is $4 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$, then the concentration of reactant A is

- (1) 4 M
- (2) 0.4 M
- (3) 0.2 M
- (4) 0.02 M

191. In Dumas method for estimation of nitrogen 0.50 g of an organic compound gave 76 mL of nitrogen gas at 300 K and 700 mm Hg. The percentage composition of nitrogen in the compound is approximately

(Assume there is no aqueous tension)

- (1) 39%
- (2) 16%
- (3) 4%
- (4) 28%

Space for Rough Work

192. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R):

Assertion (A): Energies of the orbitals in the same subshell decrease as

$$E_{2s}(\text{H}) > E_{2s}(\text{Li}) > E_{2s}(\text{Na}) > E_{2s}(\text{K})$$

Reason (R): Energies of the orbitals in the same subshell increase with increase in Z_{eff} .

In the light of the above statements, choose the correct answer from the options given below:

- (1) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
- (2) (A) is true but (R) is false
- (3) (A) is false but (R) is true
- (4) Both (A) and (R) are true and (R) is the correct explanation of (A)

193. In which of the following arrangements the given sequence is not strictly according to the property indicated against it?

(1)	$\text{H}_2\text{Te} < \text{H}_2\text{Se} < \text{H}_2\text{S} < \text{H}_2\text{O}$	:	Increasing thermal stability
(2)	$\text{SbH}_3 < \text{AsH}_3 < \text{PH}_3 < \text{NH}_3$	:	Increasing basic character
(3)	$\text{I}_2 < \text{Br}_2 < \text{Cl}_2 < \text{F}_2$	:	Increasing boiling point
(4)	$\text{HF} < \text{HCl} < \text{HBr} < \text{HI}$	:	Increasing acidic character

194. The correct order of O – O bond length in following is

- (1) $\text{H}_2\text{O}_2 < \text{O}_2 < \text{O}_3$
- (2) $\text{O}_3 < \text{O}_2 < \text{H}_2\text{O}_2$
- (3) $\text{O}_2 < \text{O}_3 < \text{H}_2\text{O}_2$
- (4) $\text{O}_3 < \text{H}_2\text{O}_2 < \text{O}_2$

195. Consider the following statements regarding valence bond theory in coordination compounds.

- I. It gives quantitative interpretation of magnetic data.
- II. It does not explain the colour exhibited by coordination compounds.
- III. It does not distinguish between weak and strong ligands.

The correct statements are

- (1) I and II only
- (2) I and III only
- (3) I, II and III
- (4) II and III only

196. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R):

Assertion (A): N-Ethylbenzenesulphonamide is soluble in alkali.

Reason (R): In N-Ethylbenzenesulphonamide, the hydrogen atom attached to nitrogen is strongly acidic due to presence of strong electron withdrawing sulphonyl group.

In the light of the above statements, choose the correct answer from the options given below:

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (2) (A) is true but (R) is false
- (3) (A) is false but (R) is true
- (4) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)

197. The equilibrium constant for the cell $\text{Cu} | \text{Cu}^{2+} || \text{Ag}^+ | \text{Ag}$ at 298 K will be (approximately)

$$\left[E^\circ_{\text{Cu}^{2+}/\text{Cu}} = 0.34 \text{ V}, E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80 \text{ V} \right]$$

- (1) 2×10^{16}
- (2) 4×10^{15}
- (3) 6×10^{13}
- (4) 3×10^{14}

Space for Rough Work

CST-8 (Code-A)

198. The ionization constant of a weak acid HX is 3×10^{-9} at 298 K. Hydrolysis constant of NaX is
(1) 3.3×10^{-1} (2) 1.8×10^{-1}
(3) 2.2×10^{-5} (4) 3.3×10^{-6}
199. The value of magnetic moment in Bohr magneton for a transition metal of 4d series is $\sqrt{48}$. Its electronic configuration is
(1) $[\text{Kr}]4d^65s^1$ (2) $[\text{Kr}]4d^25s^2$
(3) $[\text{Kr}]4d^75s^2$ (4) $[\text{Kr}]4d^65s^1$
200. At standard conditions, if the change in enthalpy for the following reaction is -21 kJ mol^{-1}
 $\text{Fe}_2\text{O}_3(\text{s}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{Fe}(\text{s}) + 3\text{H}_2\text{O}(\text{l})$
Given that standard heat of formation for $\text{H}_2\text{O}(\text{l})$ is $-280.5 \text{ kJ mol}^{-1}$. The standard heat of formation (in kJ mol^{-1}) for $\text{Fe}_2\text{O}_3(\text{s})$ is
(1) -751.5
(2) -820.5
(3) -460.4
(4) -1100.5

□ □ □

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