1. The final proof for DNA as the genetic material came from the experiments of
(1) Hargobind Khorana
(2) Griffith
(3) Hershey and Chase
(4) Avery, Mcleod and McCarty
Ans: (3)

2. Spliceosomes are **not** found in cells of
(1) Bacteria
(2) Plants
(3) Fungi
(4) Animals
Ans: (1)

3. The pivot joint between atlas and axis is a type of
(1) Saddle joint
(2) Fibrous joint
(3) Cartilaginous joint
(4) Synovial joint
Ans: (4)

4. The association of histone H1 with a nucleosome indicates:
(1) The DNA double helix is exposed
(2) Transcription is occurring
(3) DNA replication is occurring
(4) The DNA is condensed into a Chromatin Fibre
Ans: (4)

5. Which of the following is made up of dead cells?
(1) Phloem
(2) Xylem parenchyma
(3) Collenchyma
(4) Phellem
Ans: (4)

6. Select the **correct** route for the passage of sperms in male frogs:
(1) Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca
(2) Testes → Bidder's canal → Kidney → Vasa efferentia → Urinogenital duct → Cloaca
(3) Testes → Vasa efferentia → Kidney → Seminal Vesicle → Urinogenital duct → Cloaca
(4) Testes → Vasa efferentia → Bidder's canal → Ureter → Cloaca
Ans: (1)

7. Adult human RBCs are enucleate. Which of the following statement(s) is/are most appropriate explanation for this feature?

(a) They do not need to reproduce
(b) They are somatic cells
(c) They do not metabolize
(d) All their internal space is available for oxygen transport

Options:

(1) (b) and (c)
(2) Only (d)
(3) Only (a)
(4) (a), (c) and (d)

Ans: (2)

8. Homozygous pureliness in cattle can be obtained by

(1) Mating of individuals of different species
(2) Mating of related individuals of same breed
(3) Mating of unrelated individuals of same breed
(4) Mating of individuals of different breed

Ans: (2)

9. A temporary endocrine gland in the human body is

(1) Corpus allatum
(2) Pineal gland
(3) Corpus cardiacum
(4) Corpus luteum

Ans: (4)

10. Viroids differ from viruses in having:

(1) RNA molecules without protein coat
(2) DNA molecules with protein coat
(3) DNA molecules without protein coat
(4) RNA molecules with protein coat

Ans: (1)

11. A decrease in blood pressure/volume will not cause the release of

(1) ADH
(2) Renin
(3) Atrial Natriuretic Factor
(4) Aldosterone

Ans: (3)

12. An example of colonial alga is

(1) *Spirogyra*
(2) *Chlorella*
(3) *Volvox*
(4) *Ulothrix*

Ans: (3)

13. The morphological nature of the edible part of coconut is

(1) Pericarp (2) Perisperm

(3) Cotyledon (4) Endosperm

Ans: (4)

14. Which of the following is correctly matched for the product produced by them?

(1) *Saccharomyces cerevisiae* : Ethanol

(2) *Acetobacter aceti* : Antibiotics

(3) *Methanobacterium* : Lactic acid

(4) *Penicillium notatum* : Acetic acid

Ans: (1)

15. Match the following sexually transmitted diseases (Column – I) with their causative agent (Column – II) and select the correct option.

Column – I	**Column – II**
(a) Gonorrhea	(i) HIV
(b) Syphilis	(ii) *Neisseria*
(c) Genital Warts	(iii) *Treponema*
(d) AIDS	(iv) *Human Papilloma* virus

Options:

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

Ans: (2)

16. In case of poriferans the spongocoel is lined with flagellated cells called:

(1) Mesenchymal cells (2) Ostia

(3) Oscula (4) Choanocytes

Ans: (4)

17. Among the following characters, which one was not considered by Mendel in his experiments on pea?

(1) Pod – Inflated or Constricted

(2) Stem – Tall or Dwarf

(3) Trichomes – Glandular or non-glandular

(4) Seed – Green or Yellow

Ans: (3)

18. Identify the wrong statement in context of heartwood.
(1) It comprises dead elements with highly lignified walls
(2) Organic compounds are deposited in it
(3) It is highly durable
(4) It conducts water and minerals efficiently
Ans: (4)

19. During DNA replication, Okazaki fragments are used to enlongate
(1) The lagging strand away from the replication fork
(2) The leading strand towards replication fork
(3) The lagging strand towards replication fork
(4) The leading strand away from replication fork
Ans: (1)

20. Mycorrhizae are the example of
(1) Mutualism
(2) Fungistasis
(3) Amensalism
(4) Antibiosis
Ans: (1)

21. Which of the following RNAs should be most abundant in animal cell?
(1) mi-RNA
(2) r-RNA
(3) t-RNA
(4) m-RNA
Ans: (2)

22. The process of separation and purification of expressed protein before marketing is called
(1) Postproduction processing
(2) Upstream processing
(3) Downstream processing
(4) Bioprocessing
Ans: (3)

23. Which among the following are the smallest living cells, known without a definite cell wall, pathogenic to plants as well as animals and can survive without oxygen?
(1) *Nostoc*
(2) *Bacillus*
(3) *Pseudomonas*
(4) Mycoplasma
Ans: (4)

24. Which of the following components provides sticky character to the bacterial cell?
(1) Glycocalyx
(2) Cell wall
(3) Nuclear membrane
(4) Plasma membrane
Ans: (1)

25. With reference to factors affecting the rate of photosynthesis, which of the following statements is **not** correct?

(1) Tomato is a greenhouse crop which can be grown in CO_2 – enriched atmosphere for higher yield

(2) Light saturation for CO_2 fixation occurs at 10% of full sunlight.

(3) Increasing atmospheric CO_2 concentration upto 0.05% can enhance CO_2 fixation rate

(4) C_3 plants responds to higher temperatures with enhanced photosynthesis while C_4 plants have much lower temperature optimum.

Ans: (4)

26. Which of the following options best represents the enzyme composition of pancreatic juice?

(1) Lipase, amylase, trypsinogen, procarboxy-peptidase

(2) Amylase, peptidase, trypsinogen, rennin

(3) Amylase, pepsin, trypsinogen, maltase

(4) Peptidase, amylase, pepsin, rennin

Ans: (1)

27. Which one of the following statements is correct, with reference to enzymes?

(1) Holoenzyme = Coenzyme + Cofactor

(2) Apoenzyme = Holoenzyme + Coenzyme

(3) Holoenzyme = Apoenzyme + Coenzyme

(4) Coenzyme = Apoenzyme + Holoenzyme

Ans: (3)

28. If there are 999 bases in an RNA that codes for a protein with 333 amino acids, and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered?

(1) 333 (2) 1

(3) 11 (4) 33

Ans: (4)

29. Asymptote in a logistic growth curve is obtained when

(1) K < N

(2) The value of 'r' approaches zero

(3) K = N

(4) K > N

Ans: (3)

30. Select the mismatch:

(1) *Equisetum* – Homosporous
(2) *Pinus* – Dioecious
(3) *Cycas* – Dioecious
(4) Salvinia – Heterosporous

Ans: (2)

31. Anaphase Promoting Complex (APC) is a protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in a human cell, which of the following is expected to occur?

(1) Recombination of chromosome arms will occur
(2) Chromosomes will not condense
(3) Chromosomes will be fragmented
(4) Chromosomes will not segregate

Ans: (4)

32. Which ecosystem has the maximum biomass?

(1) Lake ecosystem (2) Forest ecosystem
(3) Grassland ecosystem (4) Pond ecosystem

Ans: (2)

33. Zygotic meiosis is characteristic of

(1) *Chlamydomonas* (2) *Marchantia*
(3) *Fucus* (4) *Funaria*

Ans: (1)

34. Hypersecretion of Growth Hormone in adults does not cause further increase in height, because

(1) Muscle fibres do not grow in size after birth
(2) Growth Hormone becomes inactive in adults
(3) Epiphyseal plates close after adolescence
(4) Bones loose their sensitivity to Growth Hormone in adults

Ans: (3)

35. Frog's heart when taken out of the body continues to beat for some time
Select the best option from the following statements

(a) Frog is a poikilotherm
(b) Frog does not have any coronary circulation
(c) Heart is "myogenic" in nature
(d) Heart is autoexcitable

Options:
(1) (c) & (d)
(2) Only (c)
(3) Only (d)
(4) (a) & (b)
Ans: (1)

36. Transplantation of tissues/organs fails often due to non-acceptance by the patient's body. Which type of immune-response is responsible for such rejections?
(1) Physiological immune response
(2) Autoimmune response
(3) Cell-mediated immune response
(4) Hormonal immune response
Ans: (3)

37. Thalassemia and sickle cell anemia are caused due to a problem in globin molecule synthesis. Select the correct statement.
(1) Sickle cell anemia is due to a quantitative problem of globin molecules
(2) Both are due to a qualitative defect in globin chain synthesis
(3) Both are due to a quantitative defect in globin chain synthesis
(4) Thalassemia is due to less synthesis of globin molecules
Ans: (4)

38. An important characteristic that Hemichordates share with Chordates is
(1) Pharynx without gill slits
(2) Absence of notochord
(3) Ventral tubular nerve cord
(4) Pharynx with gill slits
Ans: (4)

39. Double fertilization is exhibited by
(1) Angiosperms
(2) Gymnosperms
(3) Algae
(4) Fungi
Ans: (1)

40. Which of the following cell organelles is responsible for extracting energy from carbohydrates to form ATP?
(1) Mitochondrion
(2) Lysosome
(3) Ribosome
(4) Chloroplast
Ans: (1)

41. Lungs are made up of air-filled sacs the alveoli. They do not collapse even after forceful expiration, because of:
(1) Expiratory Reserve Volume
(2) Residual Volume
(3) Inspiratory Reserve Volume
(4) Tidal Volume
Ans: (2)

42. Which of the following are not polymeric?
(1) Lipids
(2) Nucleic acids
(3) Proteins
(4) Polysaccharides
Ans: (1)

43. Flowers which have single ovule in the ovary and are packed into inflorescence are usually pollinated by
(1) Bat
(2) Water
(3) Bee
(4) Wind
Ans: (4)

44. Life cycle of *Ectocarpus* and *Fucus* respectively are
(1) Haplodiplontic, Haplontic
(2) Haplontic, Diplontic
(3) Diplontic, Haplodiplontic
(4) Haplodiplontic, Diplontic
Ans: (4)

45. Presence of plants arranged into well defined vertical layers depending on their height can be seen best in:
(1) Temperate Forest
(2) Tropical Savannah
(3) Tropical Rain Forest
(4) Grassland
Ans: (3)

46. Phosphonol pyruvate (PEP) is the primary CO_2 acceptor in:
(1) C_3 and C_4 plants
(2) C_3 plants
(3) C_4 plants
(4) C_2 plants
Ans: (3)

47. Good vision depends on adequate intake of carotene rich food
Select the best option from the following statements
(a) Vitamin A derivatives are formed from carotene
(b) The photopigments are embedded in the membrane discs of the inner segment
(c) Retinal is a derivative of vitamin A
(d) Retinal is a light absorbing part of all the visual photopigments

Options:
(1) (b), (c) & (d) (2) (a) & (b)
(3) (a), (c) & (d) (4) (a) & (c)
Ans: (3)

48. Which one from those given below is the period for Mendel's hybridization experiments?
(1) 1870 – 1877 (2) 1856 – 1863
(3) 1840 – 1850 (4) 1857 – 1869
Ans: (2)

49. Select the mismatch:
(1) *Rhizobium* – *Alfalfa*
(2) *Frankia* – *Alnus*
(3) *Rhodospirillum* – *Mycorrhiza*
(4) *Anabaena* – *Nitrogen fixer*
Ans: (3)

50. Attractants and rewards are required for
(1) Cleistogamy (2) Anemophily
(3) Entomophily (4) Hydrophily
Ans: (3)

51. In case of a couple where the male is having a very low sperm count, which technique will be suitable for fertilisation?
(1) Intracytoplasmic sperm injection
(2) Intrauterine transfer
(3) Gamete intracytoplasmic fallopian transfer
(4) Artificial Insemination
Ans: (4)

52. Which among these is the correct combination of aquatic mammals?
(1) Trygon, Whales, Seals (2) Seals, Dolphins, Sharks
(3) Dolphins, Seals, Trygon (4) Whales, Dolphins, Seals
Ans: (4)

53. Functional megaspore in an angiosperm develops into
(1) Embryo (2) Ovule
(3) Endosperm (4) Embryo sac
Ans: (4)

54. Root hairs develop from the region of
(1) Meristematic activity
(2) Maturation
(3) Elongation
(4) Root cap
Ans: (2)

55. A dioecious flowering plant prevents both:
(1) Cleistogamy and xenogamy
(2) Autogamy and xenogamy
(3) Autogamy and geitonogamy
(4) Geitonogamy and xenogamy
Ans: (3)

56. The hepatic portal vein drains blood to liver from
(1) Intestine
(2) Heart
(3) Stomach
(4) Kidneys
Ans: (1)

57. What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis?
(1) Negatively charged fragments do not move
(2) The larger the fragment size, the farther it moves
(3) The smaller the fragment size, the farther it moves
(4) Positively charged fragments move to farther end
Ans: (3)

58. Which of the following represents order of 'Horse'?
(1) Ferus
(2) Equidae
(3) Perissodactyla
(4) Caballus
Ans: (3)

59. Which statement is wrong for Krebs' cycle?
(1) The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid
(2) There are three points in the cycle where NAD^+ is reduced on NADH + H^+
(3) There is one point in the cycle where FAD^+ is reduced to $FADH_2$
(4) During conversion of succinyl CoA to succinic acid, a molecule of GTP is synthesised
Ans: (1)

60. Artificial selection to obtain cows yielding higher milk output represents
(1) Stabilizing followed by disruptive as it stabilizes the population to produce higher yielding cows
(2) Stabilizing selection as it stabilizes this character in the population
(3) Directional as it pushes the mean of the character in one direction
(4) Disruptive as it splits the population into two one yielding higher output and the other lower output
Ans: (3)

61. The region of Biosphere Reserve which is legally protected and where no human activity is allowed is known as
(1) Restoration zone
(2) Core zone
(3) Butter zone
(4) Transition zone
Ans: (2)

62. Receptor sites for neurotransmitters are present on
(1) Post-synaptic membrane
(2) Membranes of synaptic vesicles
(3) Pre-synaptic membrane
(4) Tips of axons
Ans: (1)

63. The vascular cambium normally gives rise to
(1) Periderm
(2) Phelloderm
(3) Primary phloem
(4) Secondary xylem
Ans: (4)

64. A baby boy aged two years is admitted to play school and passes through a dental check-up. The dentist observed that the boy had twenty teeth. Which teeth were absent?
(1) Molars
(2) Incisors
(3) Canines
(4) Pre-molars
Ans: (4)

65. The water potential of pure water is
(1) More than one
(2) Zero
(3) Less than zero
(4) More than zero but less than one
Ans: (2)

66. DNA fragments are
(1) Either positively or negatively charged depending on their size
(2) Positively charged
(3) Negatively charged
(4) Neutral
Ans: (3)

67. Capacitation occurs in
(1) Female Reproductive tract
(2) Rete testis
(3) Epididymis
(4) Vas deferens
Ans: (1)

68. The function of copper ions in copper releasing IUD's is:
(1) They inhibit ovulation
(2) They suppress sperm motility and fertilising capacity of sperms
(3) They inhibit gametogenesis
(4) They make uterus unsuitable for implantation
Ans: (2)

69. A gene whose expression helps to identify transformed cell is known as
(1) Structural gene
(2) Selectable marker
(3) Vector
(4) Plasmid
Ans: (2)

70. Which one of the following statements is not valid for aerosols?
(1) They have negative impact on agricultural land
(2) They are harmful to human health
(3) They alter rainfall and monsoon patterns
(4) They cause increased agricultural productivity
Ans: (4)

71. Which of the following statements is correct?
(1) The descending limb of loop of Henle is permeable to electrolytes
(2) The ascending limb of loop of Henle is impermeable to water
(3) The descending limb of loop of Henle is impermeable to water
(4) The ascending limb of loop of Henle is permeable to water
Ans: (2)

72. Which of the following in sewage treatment removes suspended solids?
(1) Sludge treatment
(2) Tertiary treatment
(3) Secondary treatment
(4) Primary treatment
Ans: (4)

73. GnRH, a hypothalamic hormone, needed in reproduction, acts on
(1) Posterior pituitary gland and stimulates secretion of LH and relaxin
(2) Anterior pituitary gland and stimulates secretion of LH and oxytocin
(3) Anterior pituitary gland and stimulates secretion of LH and FSH
(4) Posterior pituitary gland and stimulates secretion of oxytocin and FSH
Ans: (3)

74. Which of the following facilitates opening of stomatal aperture?
(1) Longitudinal orientation of cellulose microfibrils in the cell wall of guard cells
(2) Contraction of outer wall of grand cells
(3) Decrease in turgidity of guard cells
(4) Radial orientation of cellulouse microfibrilis in the cell wall of guard cells
Ans: (4)

75. The genotypes of a Husband and Wife are I^AI^B and I^Ai.
Among the blood types of their children, how many different genotypes and phenotypes are possible?
(1) 4 genotypes ; 4 phenotypes
(2) 3 genotypes; 3 phenotypes
(3) 3 genotypes; 4 phenotypes
(4) 4 genotypes; 3 phenotypes
Ans: (4)

76. Plants which produce characteristic pneumatophores and show vivipary belong to
(1) Hydrophytes
(2) Mesophytes
(3) Halophytes
(4) Psammophytes
Ans: (3)

77. Alexander Von Humboldt described for the first time
(1) Population Growth equation
(2) Ecological Biodiversity
(3) Laws of limiting factor
(4) Species area relationships
Ans: (4)

78. DNA replication in bacteria occurs
(1) Just before transcription
(2) During S-phase
(3) Within nucleolus
(4) Prior to fission
Ans: (4)

79. MALT constitutes about _____ percent of the lymphoid tissue in human body
(1) 10%
(2) 50%
(3) 20%
(4) 70%
Ans: (2)

80. In *Bougainvillea* thorns are the modifications of
(1) Leaf
(2) Stipules
(3) Adventitious root
(4) Stem
Ans: (4)

81. Fruit and leaf drop at early stages can be prevented by the application of
(1) Gibberellic acid
(2) Cytokinins
(3) Ethylene
(4) Auxins
Ans: (4)

82. Which of the following are found in extreme saline conditions?
(1) Mycobacteria
(2) Archaebacteria
(3) Eubacteria
(4) Cyanobacteria
Ans: (2)

83. Coconut fruit is a
(1) Capsule
(2) Drupe
(3) Berry
(4) Nut
Ans: (2)

84. The DNA fragments separated on an agarose gel can be visualised after staining with
(1) Ethidium bromide
(2) Bromophenol blue
(3) Acetocarmine
(4) Aniline blue
Ans: (1)

85. Out of 'X' pairs of ribs in humans only 'Y' pairs are true ribs. Select the option that correctly represents values of X and Y and provides their explanation:

(1) X = 24, Y = 12 - True ribs are dorsally attached to vertebral column but are free on ventral side

(2) X = 12, Y = 7 - True ribs are attached dorsally to vertebral column and ventrally to the sternum

(3) X = 12, Y = 5 - True ribs are attached dorsally to vertebral column and sternum on the two ends

(4) X = 24, Y = 7 - True ribs are dorsally attached to vertebral column but are free on ventral side

Ans: (2)

86. Myelin sheath is produced by

(1) Osteoclasts and Astrocytes

(2) Schwann Cells and Oligodendrocytes

(3) Astrocytes and Schwann Cells

(4) Oligodendrocytes and Osteoclasts

Ans: (2)

87. Which of the following options gives the correct sequence of events during mitosis?

(1) Condensation → arrangement at equator → centromere division → segregation → telophase

(2) Condensation → nuclear membrane disassembly → crossing over → segregation → telophase

(3) Condensation → nuclear membrane disassembly → arrangement at equator → centromere division → segregation → telophase

(4) Condensation → crossing over → nuclear membrane disassembly → segregation → telophase

Ans: (3)

88. A disease caused by an autosomal primary non-disjunction is

(1) Sickle cell anemia (2) Down's syndrome

(3) Klinefelter's syndrome (4) Turner's syndrome

Ans: (2)

89. Which cells of 'Crypts of Lieberkuhn' secrete antibacterial lysozyme?

(1) Kupffer cells (2) Argentaffin cells

(3) Paneth cells (4) Zymogen cells

Ans: (3)

90. Which one of the following is related to *Ex-situ* conservation of threatened animals and plants?

(1) Himalayan region
(2) Wildlife Safari parks
(3) Biodiversity hot spots
(4) Amazon rainforest

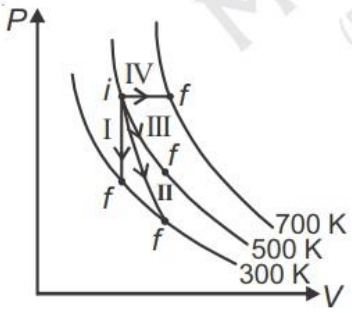
Ans: (2)

91. A spring of force constant k is cut into lengths of ratio 1 : 2 : 3. They are connected in series and the new force constant is k'. Then they are connected in parallel and force constant is k''. Then $k' : k''$ is

(1) 1 : 14
(2) 1 : 6
(3) 1 : 9
(4) 1 : 11

Ans: (4)

92. Thermodynamic processes are indicated in the following diagram.



Match the following:

Column – I	Column – II
(P) Process I	(a) Adiabatic
(Q) Process II	(b) Isobaric
(R) Process III	(c) Isochoric
(S) Process IV	(d) Isothermal

(1) P → d, Q → b, R → a, S → c
(2) P → a, Q → c, R → d, S → b
(3) P → c, Q → a, R → d, S → b
(4) P → c, Q → d, R → b, S → a

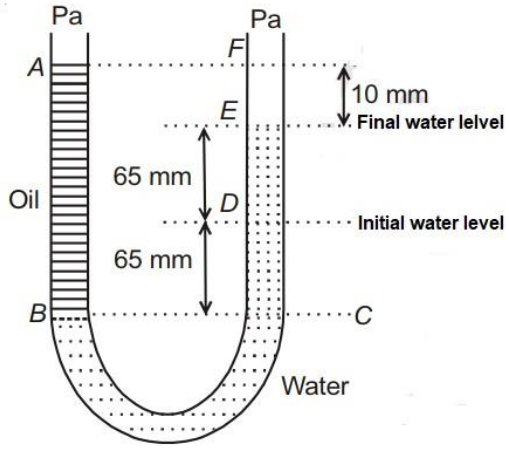
Ans: (3)

93. A capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. The total electrostatic energy of resulting system

(1) Increases by a factor of 2
(2) Increases by a factor of 4
(3) Decreases by a factor of 2
(4) Remains the same

Ans: (3)

94. A U tube with both ends open to the atmosphere, is partially filled with water. Oil, which is immiscible with water, is poured into one side until it stands at a distance of 10 mm above the water level on the other side. Meanwhile the water rises by 65 mm from its original level (see diagram). The density of the oil is



(1) 928 kg m^{-3}
(2) 650 kg m^{-3}
(3) 425 kg m^{-3}
(4) 800 kg m^{-3}
Ans: (1)

95. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T (Kelvin) and mass m, is

(1) $\frac{2h}{\sqrt{mkT}}$
(2) $\frac{h}{\sqrt{mkT}}$
(3) $\frac{h}{\sqrt{3mkT}}$
(4) $\frac{2h}{\sqrt{3mkT}}$
Ans: (3)

96. The acceleration due to gravity at a height 1 km above the earth is the same as at a depth d below the surface of earth. Then

(1) d = 2 km
(2) $d = \frac{1}{2}$ km
(3) d = 1 km
(4) $d = \frac{3}{2}$ km
Ans: (1)

97. The x and y coordinates of the particle at any time are $x = 5t - 2t^2$ and $y = 10t$ respectively, where x and y are in meters and t in seconds. The acceleration of the particle at t = 2 s is

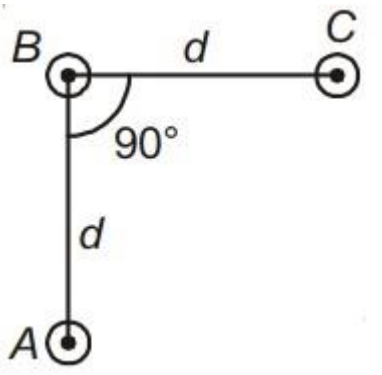
(1) −8 m/s^2
(2) 0
(3) 5 m/s^2
(4) −4 m/s^2
Ans: (4)

98. In a common emitter transistor amplifier the audio signal voltage across the collector is 3 V. The resistance of collector is 3 kΩ. If current gain is 100 and the base resistance is 2 kΩ, the voltage and power gain of the amplifier is

(1) 20 and 2000
(2) 200 and 1000
(3) 15 and 200
(4) 150 and 15000

Ans: (4)

99. An arrangement of three parallel straight wires placed perpendicular to plane of paper carrying same current '*I*' along the same direction is shown in Fig. Magnitude of force per unit length on the middle wire '*B*' is given by



(1) $\frac{\mu_0 I^2}{\sqrt{2}\pi d}$
(2) $\frac{\mu_0 I^2}{2\pi d}$
(3) $\frac{2\mu_0 I^2}{\pi d}$
(4) $\frac{\sqrt{2}\mu_0 I^2}{\pi d}$

Ans: (1)

100. Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will:

(1) Will become stationary
(2) Keep floating at the same distance between them
(3) Move towards each other
(4) Move away from each other

Ans: (3)

101. A Carnot engine having an efficiency of $\frac{1}{10}$ as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is

(1) 100 J
(2) 1 J
(3) 90 J
(4) 99 J

Ans: (3)

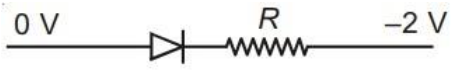
102. A 250-Turn rectangular coil of length 2.1 cm and width 1.25 cm carries a current of 85 μA and subjected to a magnetic field of strength 0.85 T. Work done for rotating the coil by 180° against the torque is

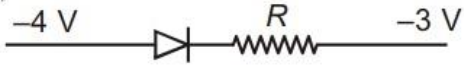
(1) 1.15 μJ
(2) 9.1 μJ
(3) 4.55 μJ
(4) 2.3 μJ

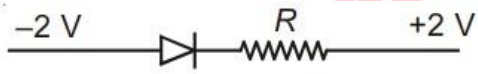
Ans: (2)

103. Which one of the following represents forward bias diode?

(1) 

(2) 

(3) 

(4) 

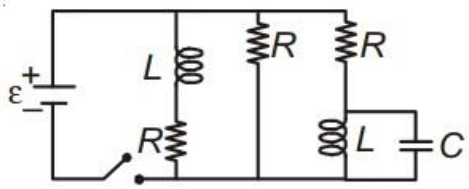
Ans: (2)

104. The ratio of wavelengths of the last line of Balmer series and the last line of Lyman series is

(1) 0.5
(2) 2
(3) 1
(4) 4

Ans: (4)

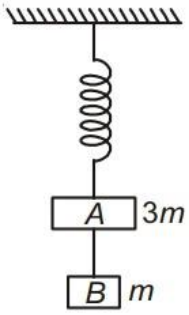
105. Figure shows a circuit contains three identical resistors with resistance R = 9.0 Ω each, two identical inductors with inductance L = 2.0 mH each, and an ideal battery with emf ε = 18V. The current 'i' through the battery just after the switch closed is



(1) 0 ampere
(2) 2 mA
(3) 0.2 A
(4) 2 A

Ans: (4*)

106. Two blocks A and B of masses $3m$ and m respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively



(1) $\frac{g}{3}, \frac{g}{3}$ (2) $g, \frac{g}{3}$

(3) $\frac{g}{3}, g$ (4) g, g

Ans: (3)

107. A long solenoid of diameter 0.1 m has 2×10^4 turns per meter. At the centre of the solenoid, a coil of 100 turns and radius 0.01 m is placed with its axis coinciding with the solenoid axis. The current in the solenoid reduces at a constant rate to 0 A from 4 A in 0.05 s. If the resistance of the coil is $10\pi^2\Omega$, the total charge flowing through the coil during this time is

(1) 16π μC (2) 32π μC

(3) 16 μC (4) 32 μC

Ans: (4)

108. A physical quantity of the dimensions of length that can be formed out of c, G and $\frac{e^2}{4\pi\varepsilon_0}$ is [c is velocity of light, G is universal constant of gravitation and e is charge]

(1) $\frac{1}{c}\ G\frac{e^2}{4\pi\varepsilon_0}$ (2) $\frac{1}{c^2}\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{\frac{1}{2}}$

(3) $c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{\frac{1}{2}}$ (4) $\frac{1}{c^2}\left[\frac{e^2}{G4\pi\varepsilon_0}\right]^{\frac{1}{2}}$

Ans: (2)

109. In an electromagnetic wave in free space the root mean square value of the electric field is E_{rms} = 6 V/m. The peak value of the magnetic field is

(1) 4.23×10^{-8} T (2) 1.41×10^{-8} T

(3) 2.83×10^{-8} T (4) 0.70×10^{-8} T

Ans: (3)

110. The resistance of a wire is 'R' ohm. If it is melted and stretched to 'n' times its original length, its new resistance will be

(1) $\frac{R}{n^2}$ (2) nR

(3) $\frac{R}{n}$ (4) n^2R

Ans: (4)

111. The ratio of resolving powers of an optical microscope for two wavelengths λ_1 = 4000 Å and λ_2 = 6000 Å

(1) 16 : 81

(2) 8 : 27

(3) 9 : 4

(4) 3 : 2

Ans: (4)

112. A thin prism having refracting angle 10° is made of glass of refractive index 1.42. This prism is combined with another thin prism of glass of refractive index 1.7. This combination produces dispersion without deviation. The refracting angle of second prism should be

(1) 10° (2) 4°

(3) 6° (4) 8°

Ans: (3)

113. Two Polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarised light I_0 is incident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its axis makes an angle 45° with that of P_1. The intensity of transmitted light through P_2 is

(1) $\frac{I_0}{16}$ (2) $\frac{I_0}{2}$

(3) $\frac{I_0}{4}$ (4) $\frac{I_0}{8}$

Ans: (4)

114. A potentiometer is an accurate and versatile device to make electrical measurements of E.M.F, because the method involves:

(1) A combination of cells, galvanometer and resistances

(2) Cells

(3) Potential gradients

(4) A condition of no current flow through the galvanometer

Ans: (4)

115. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?

(1) 40 Hz (2) 10 Hz

(3) 20 Hz (4) 30 Hz

Ans: (3)

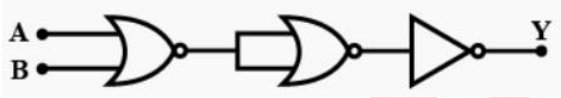
116. A beam of light from a source L is incident normally on a plane mirror fixed at a certain distance x from the source. The beam is reflected back as a spot on a scale placed just above the source L. When the mirror is rotated through a small angle θ, the spot of the light is found to move through a distance y on the scale. The angle θ is given by

(1) $\frac{x}{y}$ (2) $\frac{y}{2x}$

(3) $\frac{y}{x}$ (4) $\frac{x}{2y}$

Ans: (2)

117. The given electrical network is equivalent to



(1) NOT gate (2) AND gate

(3) OR gate (4) NOR gate

Ans: (4)

118. A particle executes linear simple harmonic motion with an amplitude of 3 cm. When the particle is at 2 cm from the mean position, the magnitude of its velocity is equal to that of its acceleration. Then its time period in seconds is

(1) $\frac{2\pi}{\sqrt{3}}$ (2) $\frac{\sqrt{5}}{\pi}$

(3) $\frac{\sqrt{5}}{2\pi}$ (4) $\frac{4\pi}{\sqrt{5}}$

Ans: (4)

119. Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time t_1. On other days, if she remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be

(1) $t_1 - t_2$ (2) $\frac{t_1+t_2}{2}$

(3) $\frac{t_1 t_2}{t_2 - t_1}$ (4) $\frac{t_1 t_2}{t_2 + t_1}$

Ans: (4)

120. Two discs of same moment of inertia rotating about their regular axis passing through centre and perpendicular to the plane of disc with angular velocities ω_1 and ω_2. They are brought into contact face to face coinciding the axis of rotation. The expression for loss of energy during this process is

(1) $\frac{I}{8}(\omega_1 - \omega_2)^2$ (2) $\frac{1}{2}I(\omega_1 + \omega_2)^2$

(3) $\frac{1}{4}I(\omega_1 - \omega_2)^2$ (4) $I(\omega_1 - \omega_2)^2$

Ans: (3)

121. A gas mixture consists of 2 moles of O_2 and 4 moles of Ar at temperature T. Neglecting all vibrational modes, the total internal energy of the system is

(1) 11 RT (2) 4 RT

(3) 15 RT (4) 9 RT

Ans: (1)

122. The bulk modulus of spherical object is 'B'. If it is subjected to uniform pressure 'p', the fractional decrease in radius is

(1) $\frac{p}{3B}$ (2) $\frac{p}{B}$

(3) $\frac{B}{3p}$ (4) $\frac{3p}{B}$

Ans: (1)

123. One end of string of length I is connected to a particle of mass 'm' and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with speed 'v', the net force on the particle (directed towards center) will be (T represents the tension in the string)

(1) Zero (2) T

(3) $T + \frac{mv^2}{I}$ (4) $T - \frac{mv^2}{I}$

Ans: (2)

124. A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force of 30 N?

(1) 5 m/s²

(2) 25 m/s²

(3) 0.25 rad/s²

(4) 25 rad/s²

Ans: (4)

125. Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8th bright fringe in the medium lies where 5th dark fringe lies in air. The refractive index of the medium is nearly

(1) 1.78 (2) 1.25

(3) 1.59 (4) 1.69

Ans: (1)

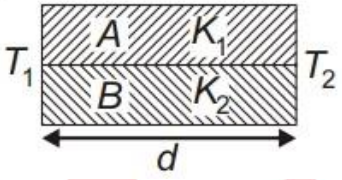
126. Suppose the charge of a proton and an electron differ slightly. One of them is $-e$, the other is $(e + \Delta e)$. If the net of electrostatic force and gravitational force between two hydrogen atoms placed at a distance d (much greater than atomic size) apart is zero, then Δe is of the order of [Given mass of hydrogen $m_h = 1.67 \times 10^{-27}$ kg]

(1) 10^{-47} C (2) 10^{-20} C

(3) 10^{-23} C (4) 10^{-37} C

Ans: (4)

127. Two rods A and B of different materials are welded together as shown in figure. Their thermal conductivities are K_1 and K_2. The thermal conductivity of the composite rod will be



(1) $2(K_1 + K_2)$ (2) $\frac{K_1 + K_2}{2}$

(3) $\frac{3(K1+K2)}{2}$ (4) $K_1 + K_2$

Ans: (2)

128. The photoelectric threshold wavelength of silver is 3250×10^{-10} m. The velocity of the electron ejected from a silver surface by ultraviolet light of wavelength 2536×10^{-10} m is

(Given $h = 4.14 \times 10^{-15}$ eVs and $c = 3 \times 10^8$ ms^{-1})

(1) $\approx 0.3 \times 10^6$ ms^{-1} (2) $\approx 6 \times 10^5$ ms^{-1}

(3) $\approx 0.6 \times 10^6$ ms^{-1} (4) $\approx 61 \times 10^3$ ms^{-1}

Ans: (2 & 3)* Both answers are correct.

129. Two cars moving in opposite directions approach each other with speed of 22 m/s and 16.5 m/s respectively. The driver of the first car blows a horn having a frequency 400 Hz. The frequency heard by the driver of the second car is [velocity of sound 340 m/s]

(1) 448 Hz (2) 350 Hz

(3) 361 Hz (4) 411 Hz

Ans: (1)

130. Consider a drop of rain water having mass 1 g falling from a height of 1 km. It hits the ground with a speed of 50 m/s. Take g constant with a value 10 m/s^2. The work done by the (i) gravitational force and the (ii) resistive force of air is

(1) (i) 10 J (ii) -8.75 J
(2) (i) -10 J (ii) -8.25 J
(3) (i) 1.25 J (ii) -8.25 J
(4) (i) 100 J (ii) 8.75 J

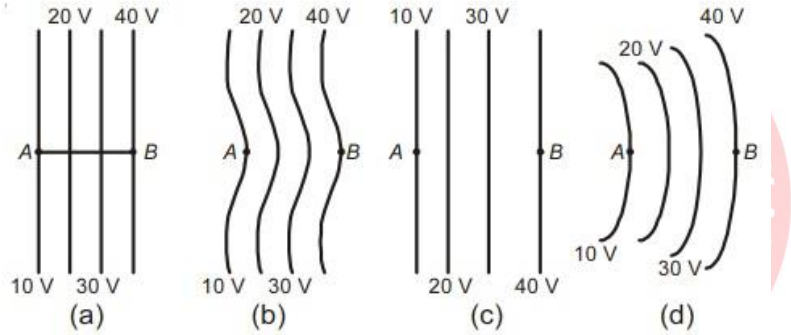
Ans: (1)

131. A spherical black body with a radius of 12 cm radiates 450 watt power at 500 K. If the radius were halved and the temperature doubled, the power radiated in watt would be

(1) 1800
(2) 225
(3) 450
(4) 1000

Ans: (1)

132. The diagrams below show regions of equipotentials.



A positive charge is moved from A to B in each diagram.

(1) Maximum work is required to move q in figure (b).
(2) Maximum work is required to move q in figure (c).
(3) In all the four cases the work done is the same.
(4) Minimum work is required to move q in figure (a).

Ans: (3)

133. Which of the following statements are correct?

(a) Centre of mass of a body always coincides with the centre of gravity of the body.
(b) Centre of mass of a body is the point at which the total gravitational torque on the body is zero
(c) A couple on a body produce both translational and rotational motion in a body.
(d) Mechanical advantage greater than one means that small effort can be used to lift a large load.

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

Ans: (2)

134. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip θ is given by

(1) $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$

(2) $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$

(3) $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$

(4) $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$

Ans: (2)

135. Radioactive material 'A' has decay constant '8λ' and material 'B' has decay constant 'λ'. Initially they have same number of nuclei. After what time, the ratio of number of nuclei of material 'B' to that 'A' will be $\frac{1}{e}$?

(1) $\frac{1}{9\lambda}$ (2) $\frac{1}{\lambda}$

(3) $\frac{1}{7\lambda}$ (4) $\frac{1}{8\lambda}$

Ans: (3)

136. The equilibrium constants of the following are:

$N_2 + 3H_2 \rightleftharpoons 2NH_3$ K_1

$N_2 + O_2 \rightleftharpoons 2NO$ K_2

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O$ K_3

The equilibrium constant (K) of the reaction

$2NH_3 + \frac{5}{2}O_2 \overset{K}{\rightleftharpoons} 2NO + 3H_2O$, will be

(1) $K_2^3K_3/K_1$ (2) $K_1K_3^3/K_2$

(3) $K_2K_3^3/K_1$ (4) $K_2\,K_3/K_1$

Ans: (3)

137. The heating of phenyl-methyl ethers with HI produces.

(1) Benzene (2) Ethyl chlorides

(3) lodobenzene (4) Phenol

Ans: (4)

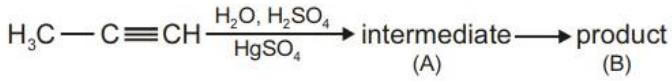
138. The most suitable method of separation of 1 : 1 mixture of ortho and para-nitrophenols is

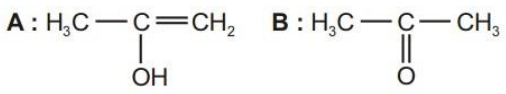
(1) Steam distillation (2) Sublimation

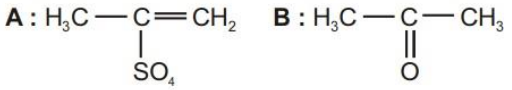
(3) Chromatography (4) Crystallisation

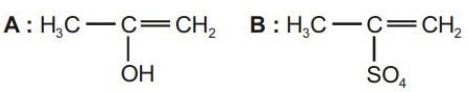
Ans: (1)

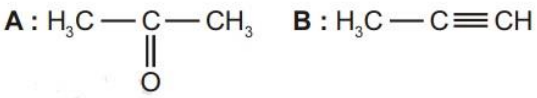
139. Predict the correct intermediate and product in the following reaction:



(1) 

(2) 

(3) 

(4) 

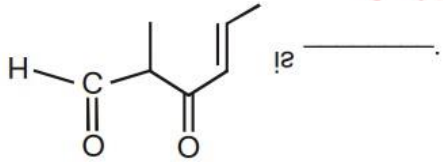
Ans: (1)

140. Which of the following reactions is zappropriate for converting acetamide to methanamine?

(1) Gabriels phthalimide synthesis
(2) Carbylamine reaction
(3) Hoffmann hypobromamide reaction
(4) Stephens reaction

Ans: (3)

141. The IUPAC name of the compound



(1) 3-keto-2-methylhex-5-enal
(2) 3-keto-2-methylhex-4-enal
(3) 5-formylhex-2-en-3-one
(4) 5-methyl-4-oxohex-2-en-5-al

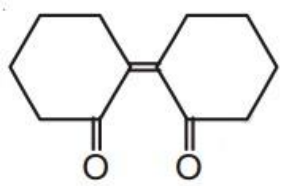
Ans: (2)

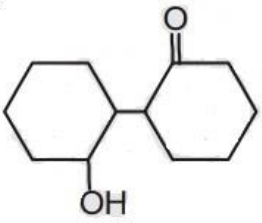
142. Which of the following is a sink for CO?

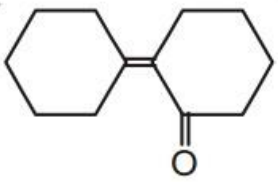
(1) Plants
(2) Haemoglobin
(3) Micro-organisms present in the soil
(4) Oceans

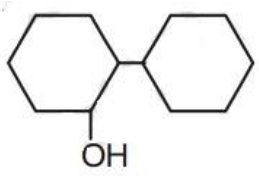
Ans: (3)

143. Of the following, which is the product formed when cyclohexanone undergoes aldol condensation followed by heating?

(1) 

(2) 

(3) 

(4) 

Ans: (3)

144. Which of the following pairs of compounds is isoelectronic and isostructural?

(1) IF_3, XeF_2

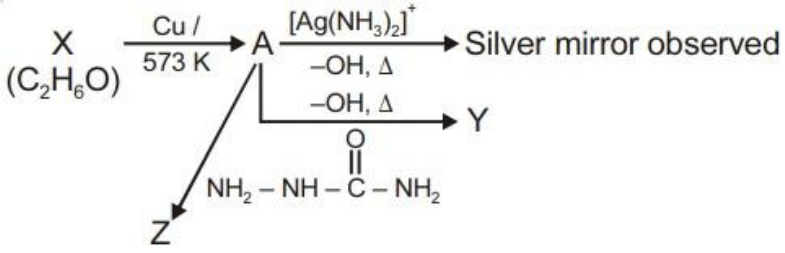
(2) $BeCl_2$, XeF_2

(3) TeI_2, XeF_2

(4) IBr_2^-, XeF_2

Ans: (4)

145. Consider the reactions:



Identify A, X, Y and Z

(1) A-Ethanol, X-Acetaldehyde, Y-Butanone, Z-Hydrazone

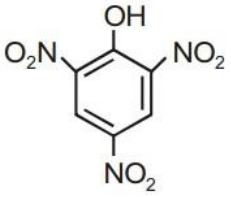
(2) A-Methoxymethane, X-Ethanoic acid, Y-Acetate ion, Z-Hydrazine

(3) A-Methoxymethane, X- Ethanol, Y- Ethanoic acid, Z-Semicarbazide

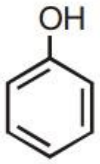
(4) A-Ethanal, X-Ethanol, Y-But-2-enal, Z-Semicarbazone

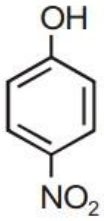
Ans: (4)

146. Which one is the most acidic compound?

(1) 

(2) 

(3) 

(4) 

Ans: (1)

147. Name the gas that can readily decolourises acidified $KMnO_4$ solution:

(1) P_2O_5 (2) CO_2

(3) SO_2 (4) NO_2

Ans: (3)

148. Which one is the **correct** order of acidity?

(1) $CH_3 - CH_3 > CH_2 = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

(2) $CH_2 = CH_2 > CH_3 - CH \equiv CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

(3) $CH \equiv CH > CH_3 - C \equiv CH > CH_2 = CH_2 > CH_3 - CH_3$

(4) $CH \equiv CH > CH_2 = CH_2 > CH_3 - C \equiv CH > CH_3 - CH_3$

Ans: (3)

149. Concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is 2.2×10^{-4} mol L^{-1}. Solubility product of $Ag_2C_2O_4$ is

(1) 5.3×10^{-12} (2) 2.42×10^{-8}

(3) 2.66×10^{-12} (4) 4.5×10^{-11}

Ans: (1)

150. With respect to the conformers of ethane, which of the following statements is true?

(1) Both bond angles and bond length remains same

(2) Both angle remains same but bond length changes

(3) Bond angle changes but bond length remains same

(4) Both bond angle and bond length change

Ans: (1)

151. The correct statement regarding electrophile is

(1) Electrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile

(2) Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from a nucleophile

(3) Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from another electrophile

(4) Electrophiles are generally neutral species and can form a bond by accepting a pair of electrons from a nucleophile

Ans: (1)

152. Which one is the wrong statement?

(1) The energy of 2s orbital is less than the energy of 2*p* orbital in case of Hydrogen like atoms.

(2) de-Broglie's wavelength is given by $\lambda = \frac{h}{mv}$, where m = mass of the particle, v = group velocity of the particle

(3) The uncertainty principle is $\Delta E \times \Delta t \geq \frac{h}{4\pi}$

(4) Half-filled and fully filled orbitals have greater stability due to greater exchange energy, greater symmetry and more balanced arrangement

Ans: (1)

153. Correct increasing order for the wavelengths of absorption in the visible region for the complexes of Co^{3+} is

(1) $[Co(NH_3)_6]^{3+}$, $[Co(en)_3]^{3+}$, $[Co(H_2O)_6]^{3+}$

(2) $[Co(en)_3]^{3+}$, $[Co(NH_3)_6]^{3+}$, $[Co(H_2O)_6]^{3+}$

(3) $[Co(H_2O)_6]^{3+}$, $[Co(en)_3]^{3+}$, $[Co(NH_3)_6]^{3+}$

(4) $[Co(H_2O)_6]^{3+}$, $[Co(NH_3)_6]^{3+}$, $[Co(en)_3]^{3+}$

Ans: (2)

154. Match the interhalogen compounds of column I with the geometry in column II and assign the correct code

Column I	**Column II**
(a) XX'	(i) T-shape
(b) XX'_3	(ii) Pentagonal bipyramidal
(c) XX'_5	(iii) Linear
(d) XX'_7	(iv) Square-pyramidal
	(v) Tetrahedral

Code:

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

Ans: (3)

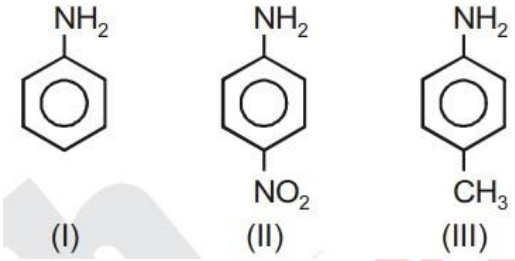
155. The species, having bond angles of 120° is

(1) BCl_3 (2) PH_3

(3) ClF_3 (4) NCl_3

Ans: (1)

156. The correct increasing order of basic strength for the following compounds is



(I) (II) (III)

(1) II < I < III (2) II < III < I

(3) III < I < II (4) III < II < I

Ans: (1)

157. Which one of the following statements is not correct?

(1) Coenzymes increase the catalytic activity of enzyme

(2) Catalyst does not initiate any reaction

(3) The value of equilibrium constant is changed in the presence of a catalyst in the reaction at equilibrium

(4) Enzymes catalyse mainly bio-chemical reactions

Ans: (3)

158. A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 atm from an initial volume of 2.50 L to a final volume of 4.50 L. The change in internal energy ΔU of the gas in joules will be

(1) +505 J (2) 1136.25 J

(3) -500 J (4) -505 J

Ans: (4)

159. A 20 litre container at 400 K contains $CO_2(g)$ at pressure 0.4 atm and an excess of SrO (neglect the volume of solid SrO). The volume of the containers is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of CO_2 attains its maximum value, will be

(Given that: $SrCO_3(s) \rightleftharpoons SrO(s) + CO_2(g)$. K_p = 1.6 atm)

(1) 2 litre
(2) 5 litre
(3) 10 litre
(4) 4 litre

Ans: (2)

160. Which of the following statements is not correct?

(1) Denaturation makes the proteins more active
(2) Insulin maintains sugar level in the blood of a human body
(3) Ovalbumin is a simple food reserve in egg-white
(4) Blood proteins thrombin and fibrinogen are involved in blood clotting

Ans: (1)

161. Mechanism of a hypothetical reaction $X_2 + Y_2 \rightarrow 2XY$ is given below:

(i) $X_2 \rightarrow X + X$ (fast)
(ii) $X + Y_2 \rightleftharpoons XY + Y$ (slow)
(iii) $X + Y \rightarrow XY$ (fast)

The overall order of the reaction will be

(1) 1.5
(2) 1
(3) 2
(4) 0

Ans: (1)

162. In which pair of ions both the species contain S – S bond?

(1) $S_4O_6^{2-}$, $S_2O_7^{2-}$
(2) $S_2O_7^{2-}$, $S_2O_3^{2-}$
(3) $S_4O_6^{2-}$, $S_2O_3^{2-}$
(4) $S_2O_7^{2-}$, $S_2O_8^{2-}$

Ans: (3)

163. Which one of the following pairs of species have the same bond order?

(1) N_2, O_2^-
(2) CO, NO
(3) O_2, NO^+
(4) CN^-, CO

Ans: (4)

164. Mixture of chloroxylenol and terpineol acts as

(1) Antibiotic
(2) Analgesic
(3) Antiseptic
(4) Antipyretic

Ans: (3)

165. It is because of inability of ns^2 electrons of the valence shell to participate in bonding that
(1) Sn^{4+} is reducing while Pb^{4+} is oxidising
(2) Sn^{2+} is reducing while Pb^{4+} is oxidising
(3) Sn^{2+} is oxidising while Pb^{4+} is reducing
(4) Sn^{2+} and Pb^{2+} are both oxidising and reducing
Ans: (2)

166. For a given reaction, $\Delta H = 35.5\ kJ\ mol^{-1}$ and $\Delta S = 83.6\ JK^{-1}\ mol^{-1}$. The reaction is spontaneous at : (Assume that ΔH and ΔS do not vary with temperature)
(1) $T > 298\ K$
(2) $T < 425\ K$
(3) $T > 425\ K$
(4) All temperatures
Ans: (3)

167. If molality of the dilute solution is doubled, the value of molal depression constant (K_f) will be
(1) Unchanged
(2) Doubled
(3) Halved
(4) Tripled
Ans: (1)

168. Which of the following is dependent on temperature?
(1) Weight percentage
(2) Molality
(3) Molarity
(4) Mole fraction
Ans: (3)

169. Pick out the correct statement with respect $[Mn(CN)_6]^{3-}$
(1) It is dsp^2 hybridised and square planar
(2) It is sp^3d^2 hybridised and octahedral
(3) It is sp^3d^2 hybridised and tetrahedral
(4) It is d^2sp^3 hybridised and octahedral
Ans: (4)

170. Which is the incorrect statement?
(1) Frenkel defect is favoured in those ionic compounds in which sizes of cation and anions are almost equal
(2) $FeO_{0.98}$ has non stoichiometric metal deficiency defect
(3) Density decreases in case of crystals with Schottky's defect
(4) NaCl(s) is insulator, silicon is semiconductor, silver is conductor, quartz is piezo electric crystal
Ans: (1 & 2)*

171. $HgCl_2$ and I_2 both when dissolved in water containing I^- ions the pair of species formed is

(1) Hg_2I_2, I^- (2) HgI_2, I_3^-

(3) HgI_2, I^- (4) HgI_4^{2-}, I_3^-

Ans: (4)

172. Extraction of gold and silver involves leaching with CN^- ion. Silver is later recovered by

(1) Displacement with Zn (2) Liquation

(3) Distillation (4) Zone refining

Ans: (1)

173. The correct order of the stoichiometries of AgCl formed when $AgNO_3$ in excess is treated with the complexes: $CoCl_3 \cdot 6NH_3$, $CoCl_3 \cdot 5NH_3$, $CoCl_3 \cdot 4NH_3$ respectively is

(1) 2 AgCl, 3 AgCl, 1 AgCl

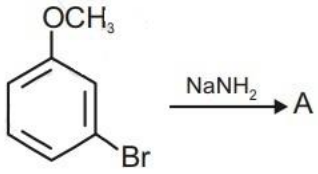
(2) 1 AgCl, 3 AgCl, 2 AgCl

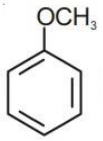
(3) 3 AgCl, 1 AgCl, 2 AgCl

(4) 3 AgCl, 2 AgCl, 1 AgCl

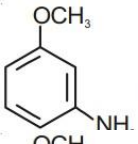
Ans: (4)

174. Identify A and predict the type of reaction

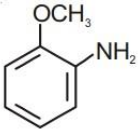


(1) 

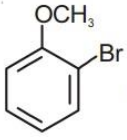
and cine substitution reaction

(2) 

and substitution reaction

(3) 

and elimination addition reaction

(4) 

and cine substitution reaction

Ans: (2)

175. An example of a sigma bonded organometallic compound is

(1) Cobaltocene (2) Ruthenocene

(3) Grignard's reagent (4) Ferrocene

Ans: (3)

176. The reason for greater range of oxidation states in actinoids is attributed to

(1) 4*f* and 5*d* levels being close in energies

(2) The radioactive nature of actinoids

(3) Actinoid contraction

(4) 5*f*, 6*d* and 7*s* levels having comparable energies

Ans: (4)

177. The element Z = 114 has been discovered recently. It will belong to which of the following family group and electronic configuration?

(1) Nitrogen family, [Rn] $5f^{14}6d^{10}7s^27p^6$

(2) Halogen family, [Rn] $5f^{14}6d^{10}7s^27p^5$

(3) Carbon family, [Rn] $5f^{14}6d^{10}7s^27p^2$

(4) Oxygen family, [Rn] $5f^{14}6d^{10}7s^27p^4$

Ans: (3)

178. A first order reaction has a specific reaction rate of 10^{-2} s^{-1}. How much time will it take for 20 g of the reactant to reduce to 5 g?

(1) 693.0 second (2) 238.6 second

(3) 138.6 second (4) 346.5 second

Ans: (3)

179. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field?

(1) Li (2) Na

(3) K (4) Rb

Ans: (1)

180. In the electrochemical cell

$Zn|ZnSO_4(0.01M)||CuSO_4(1.0\ M)|Cu$, the emf of this Daniel cell is E_1. When the concentration of $ZnSO_4$ is changed to 1.0 M and that of $CuSO_4$ changed to 0.01 M, the emf changes to E_2. From the following, which one is the relationship between E_1 and E_2?

(Given, $\frac{RT}{F} = 0.059$)

(1) $E_2 = 0 \neq E_1$ (2) $E_1 = E_2$

(3) $E_1 < E_2$ (4) $E_1 > E_2$ Ans: (4)