NATIONAL ELIGIBILITY CUM ENTRANCE TEST

NEET (UG), 2015
(CODE:A)
1. 2,3-Dimethyl-2-butene can be prepared by heating which of the following compounds with a strong acid?
   (1) (CH₃)₂C=CH-CH₂-CH₃
   (2) (CH₃)₂CH-CH=CH₂
   (3) (CH₃)₂CH=CH-CH₂-CH₃
   (4) (CH₃)₂C-CH=CH₂

2. Gadolinium belongs to 4f series. Its atomic number is 64. Which of the following is the correct electronic configuration of gadolinium?
   (1) [Xe] 4f⁵d¹6s²
   (2) [Xe] 4f⁶5d²6s²
   (3) [Xe] 4f⁸6d²
   (4) [Xe] 4f⁹5s¹

3. The formation of the oxide ion, O²⁻ (g), from oxygen atom requires first an exothermic and then an endothermic step as shown below:
   O(g) + e⁻ → O⁻ (g); ΔH° = -141 kJ mol⁻¹
   O⁻ (g) + e⁻ → O²⁻ (g); ΔH° = +780 kJ mol⁻¹

Thus process of formation of O²⁻ in gas phase is unfavourable even though O²⁻ is isoloelectronic with neon. It is due to the fact that:
(1) oxygen is more electronegative
(2) addition of electron in oxygen results in larger size of the ion.
(3) electron repulsion outweighs the stability gained by achieving noble gas configuration
(4) O⁻ ion has comparatively smaller size than oxygen atom.

4. The number of structural isomers possible from the molecular formula C₃H₇N is:
   (1) 2
   (2) 3
   (3) 4
   (4) 5

5. If the equilibrium constant for N₂(g) + O₂(g) → 2NO(g) is K, the equilibrium constant for ¹₂ N₂(g) + ¹₂ O₂(g) → NO(g) will be:
   (1) K
   (2) K²
   (3) K¹²
   (4) K⁻¹²

6. Strong reducing behaviour of H₃PO₂ is due to:
   (1) high oxidation state of phosphorus
   (2) presence of two -OH groups and one P-H bond
   (3) presence of one -OH group and two P-H bonds
   (4) high electron gain enthalpy of phosphorus

7. What is the ionic form of aluminum hydroxide, Al(OH)₃, that is present in water?
   (1) Al₃⁺, OH⁻
   (2) AlOH²⁺, OH⁻
   (3) Al(OH)₂⁺, OH⁻
   (4) Al(OH)₃⁺, OH⁻

8. The formation of the oxo anion, O₂⁻ (g), from oxygen atom requires first an exothermic and then an endothermic step as shown below:
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9. The number of structural isomers possible from the molecular formula C₃H₇Cl is:
   (1) 2
   (2) 3
   (3) 4
   (4) 5

10. The formation of the oxide ion, O²⁻ (g), from oxygen atom requires first an exothermic and then an endothermic step as shown below:
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12. The number of water molecules is maximum in:
   (1) 18 gram of water
   (2) 18 moles of water
   (3) 18 molecules of water
   (4) 1.8 gram of water

13. In which of the following pairs, both the species are not isostructural?
   (1) SiCl₄, Si₃Cl₄
   (2) NaCl, NaBr
   (3) H₂O, H₂S
   (4) diamond, silicon carbide

14. In the reaction with HCl, an alkene reacts according to the Markovnikov's rule, to give a product 1-chloro-1-methylcyclohexane. The possible alkene is:
   (1) CH₂=CH₂
   (2) CH₃CH=CH₂
   (3) CH₃=CHCH₂CH₃
   (4) CH₃CH₂CH₂=CH₂

15. Assuming complete ionization, same moles of which of the following compounds will require the least amount of acidified K_MnO₄ for complete oxidation?
   (1) FeC₂O₄
   (2) Fe(NO₃)₂
   (3) FeSO₄
   (4) Fe₂(SO₄)₃

16. Reaction of phenol with chloroform in presence of dilute sodium hydroxide finally introduces which one of the following functional group?
   (1) -OH
   (2) -CHO
   (3) -CH₂Cl
   (4) -COOH

17. The vacant space in bcc lattice unit cell is:
   (1) 25%
   (2) 32%
   (3) 26%
   (4) 48%

18. Which of the statements given below is incorrect?
   (1) CN⁻ is isoelectronic with O₂N⁻
   (2) O₃F₂ is an oxide of fluorine
   (3) CO₂ is an anhydride of perchloric acid
   (4) O₃ molecule is bent

19. The name of complex ion, [Fe(CN)₆]³⁻ is:
   (1) Tricyanoferrate (III) ion
   (2) Hexacyanoferrate (II) ion
   (3) Hexacyanoferrate (III) ion
   (4) Hexacyanoferrate (IV) ion

20. If Avogadro number Nₐ is changed from 6.022 x 10²³ mol⁻¹ to 6.022 x 10²⁰ mol⁻¹, this would change:
   (1) the ratio of chemical species to each other in a balanced equation.
   (2) the ratio of elements to each other in a compound.
   (3) the definition of mass in units of grams.
   (4) the mass of one mole of carbon.

21. Which of the following statements is not correct for a nucleophile?
   (1) Nucleophiles attack low e⁻ density sites.
   (2) Nucleophiles do not electron seeking.
   (3) Nucleophile is a Lewis acid.
   (4) Ammonia is a nucleophile.

22. A gaseous carbon monoxide would be most likely to obey the ideal gas law at:
   (1) high temperatures and high pressures
   (2) low temperatures and low pressures.
   (3) high temperatures and low pressures.
   (4) low temperatures and high pressures.
23. The hybridization is: (\(\text{At. No. N1} = 28\))
   (1) \(d^2sp^2\)
   (2) \(d^2sp^3\)
   (3) \(dsp^3\)
   (4) \(sp^3\)

24. The heat of combustion of carbon to \(\text{CO}_2\) is \(-393.5\) kJ/mol. The heat released upon formation of 35.2 g of \(\text{CO}_2\) from carbon and oxygen gas is:
   (1) \(-630\) kJ
   (2) \(-530\) kJ
   (3) \(-3.15\) kJ
   (4) \(+315\) kJ

25. The stability of \(+1\) oxidation state among \(\text{Al, Ga, In, Tl}\) increases in the sequence:
   (1) \(\text{Tl} < \text{In} < \text{Ga} < \text{Al}\)
   (2) \(\text{In} < \text{Tl} < \text{Ga} < \text{Al}\)
   (3) \(\text{Ga} < \text{In} < \text{Al} < \text{Tl}\)
   (4) \(\text{Al} < \text{Ga} < \text{In} < \text{Tl}\)

26. Reaction of a carbonyl compound with one of the following reagents involves nucleophilic addition followed by elimination of water. The reagent is:
   (1) hydrocyanic acid
   (2) sodium hydrogen sulhide
   (3) Grignard reagent
   (4) hydrazine in presence of feebly acidic solution

27. Satisfactory answer in the exam in which subject was given:
   (1) \(\text{KCl}\) is an electron donor.
   (2) \(\text{KCl}\) is an electron acceptor.
   (3) \(\text{KBr}\) is a strong salt.
   (4) \(\text{KCl}\) is a strong acid.

28. CH\(_3\)CHOH COOH, which is optically active, are called:
   (1) Enantiomers
   (2) Mesoisomers
   (3) Diastereomers
   (4) Atropisomers

29. Two possible stereo-structures of CH\(_3\)CHOH COOH, which are optically active, are called:
   (1) Enantiomers
   (2) Mesoisomers
   (3) Diastereomers
   (4) Atropisomers

30. The following reaction

\[
\text{C}_6\text{H}_5\text{CH} = \text{CH}_2 + \text{H}_2\text{C} = \text{CH}_2 \rightarrow \text{C}_6\text{H}_5\text{CH} = \text{CHCH}_2\text{CH} = \text{CH}_2
\]

is known by the name:
   (1) Acetylation reaction
   (2) Schotten-Baumen reaction
   (3) Friedel-Craft reaction
   (4) Perkin's reaction

31. The sum of coordination number and oxidation number of the metal M in the complex \([\text{M(en]}(\text{CO}_3)_2]\text{Cl}\) (where en is ethylenediamine) is:
   (1) 7
   (2) 8
   (3) 9
   (4) 6

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   (4) hydrazine in presence of feebly acidic solution

33. Which one of the following esters gets hydrolysed most easily under alkaline conditions?
   (1) OCOCH\(_3\)
   (2) ClCOCH\(_3\)
   (3) O\(_2\)NCOCH\(_3\)
   (4) HCOOCH\(_3\)

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   (3) O\(_2\)NCOCH\(_3\)
   (4) HCOOCH\(_3\)
35. The rate constant of the reaction \( A \rightarrow B \) is \( 0.6 \times 10^{-3} \) mole per second. If the concentration of \( A \) is 5 M then concentration of \( B \) after 20 minutes is:

(1) 0.3 M  
(2) 0.72 M  
(3) 1.08 M  
(4) 3.60 M

36. What is the pH of the resulting solution when equal volumes of 0.1 M NaOH and 0.01 M HCl are mixed?

(1) 7.0  
(2) 1.0  
(3) 12.65  
(4) 2.0

37. Number of possible isomers for the complex \([Co(en)_2Cl_2]\) will be:

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

38. The variation of the boiling points of the hydrogen halides is in the order HF > HI > HBr > HCl. What explains the higher boiling point of hydrogen fluoride?

(1) The bond energy molecules is greater than other hydrogen halides.  
(2) The effect of nuclear shielding is much reduced in fluorine which polarises the HF molecule.  
(3) The electronegativity of fluorine is much higher than for other elements in the group.  
(4) There is strong hydrogen bonding between HF molecules.

39. What is the mass of the precipitate formed when 50 mL of 16.9% solution of AgNO₃ is mixed with 50 mL of 5.8% NaCl solution?

\( \text{Ag} = 107.8, \text{Na} = 23, \text{Cl} = 35.5 \)  
(1) 7 g  
(2) 14 g  
(3) 28 g  
(4) 35 g

40. The oxidation of benzene by \( V_2O_5 \) in the presence of air produces:

(1) benzoic acid  
(2) benzoic aldehyde  
(3) benzoic anhydride  
(4) maleic anhydride

41. Which of the following is not the product of dehydration of \( \text{OH} \)?

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

42. Method by which Aniline cannot be prepared is:

(1) reduction of nitrobenzene with \( \text{H}_2/\text{Pd} \) in ethanol.  
(2) potassium salt of phthalimide treated with chlorobenzene followed by hydrolysis with aqueous NaOH solution.  
(3) hydrolysis of phenylisocyanide with acidic solution.  
(4) degradation of benzamide with bromine in alkaline solution.

43. Which of the following reaction(s) can be used for the preparation of alkyl halides?

(1) \( \text{CH}_3\text{CH}_2\text{OH} + \text{HCl} \rightarrow \text{CH}_3\text{CH}_2\text{Cl} \)  
(2) \( \text{CH}_3\text{CH}_2\text{OH} + \text{HCl} \rightarrow \text{CH}_3\text{CH}_2\text{OH} + \text{HCl} \)  
(3) \( \text{CH}_3\text{OH} + \text{HCl} \rightarrow \text{CH}_3\text{COH} + \text{HCl} \)  
(4) \( \text{CH}_3\text{COH} + \text{HCl} \rightarrow \text{CH}_3\text{CH}_2\text{Cl} \)

(1) (I) and (IV) only  
(2) (I), (III) and (IV) only  
(3) (I), (III) and (IV) only  
(4) (I) and (IV) only
44. Which is the correct order of increasing energy of the listed orbitals in the atom of titanium?

(At. no. Z = 22)

(1) 3s 3p 3d 4s
(2) 3s 3p 3d 4s
(3) 3s 3p 4s 3d
(4) 4s 3s 3p 3d

45. In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide with:

(1) copper(I) sulphide
(2) sulphur dioxide
(3) iron(II) sulphide
(4) carbon monoxide

46. Root pressure develops due to:

(1) Increase in transpiration
(2) Active absorption
(3) Low osmotic potential in soil
(4) Passive absorption

47. Which one is a wrong statement?

(1) Brown algae have chlorophyll a and c, and xanthophyll.
(2) Archegonia are found in Bryophyta, Pteridophyta and Gymnosperms.
(3) Mucor has biflagellate zoospores.
(4) Haploid endospore is typical feature of gymnosperms.

48. Which of the following structures is not found in a prokaryotic cell?

(1) Plasma membrane
(2) Nuclear envelope
(3) Ribosome
(4) Mesosome

49. Which one of the following animals has two separate circulatory pathways?

(1) Shark
(2) Frog
(3) Lizard
(4) Whale

50. Most animals that live in deep oceanic water live in the deepest part of the ocean. The correct sequence of increasing energy of the listed orbitals in the atom of titanium is:

(1) 3s 3p 3d 4s
(2) 3s 3p 4s 3d
(3) 3s 3p 3d 4s
(4) 4s 3s 3p 3d

51. An association of individuals of different species living in the same habitat and having functional interactions is:

(1) Population
(2) Ecological niche
(3) Biotic community
(4) Ecosystem

52. The oxygen evolved during photosynthesis comes from water molecules. Which one of the following pairs of elements is involved in this reaction?

(1) Magnesium and Chlorine
(2) Manganese and Chlorine
(3) Manganese and Potassium
(4) Magnesium and Molybdenum

53. Asexual placentalion is present in:

(1) Argemone
(2) Dianthus
(3) Lemon
(4) Pea

54. In which of the following both pairs have correct combination?

(1) Gaseous nutrient cycle Carbon and Nitrogen
(2) Sedimentary nutrient cycle Carbon and Nitrogen
55. In mammalian eye, the 'fovea' is the center visual field, where  
(1) more rods than cones are found  
(2) high density of cones occur, but has no rods.  
(3) the optic nerve leaves the eye.  
(4) only rods are present.

56. Choose the wrong statement:  
(1) Yeast is unicellular and useful in fermentation  
(2) Penicillin is multicellular and produces antibiotics  
(3) Neurospora is used in the study of biochemical genetics  
(4) Morels and truffles are poisonous mushrooms

57. Which of the following are not membrane-bound?  
(1) Mesosomes  
(2) Vacuoles  
(3) Ribosomes  
(4) Lysosomes

58. In which of the following interactions both partners are adversely affected?  
(1) Mutualism  
(2) Competition  
(3) Predation  
(4) Parasitism

59. A colour blind man marries a woman with normal sight who has no history of colour blindness in her family. What is the probability of their grandson being colour blind?  
(1) 0.25  
(2) 0.5  
(3) 1  
(4) Nil

60. Ectopic pregnancies are referred to as :  
(1) Pregnancies terminated due to hormonal imbalance.  
(2) Pregnancies with genetic abnormality.  
(3) Implantation of embryos at site other than uterus.  
(4) Implantation of defective embryos in the uterus

61. The term 'linkage' was coined by:  
(1) W. Sutton  
(2) T. H. Morgan  
(3) T. Boveri  
(4) G. Mendel

62. Cell wall is absent in:  
(1) Neote  
(2) Aspergillus  
(3) Fusarium  
(4) Mycoplasma

63. Which of the following biomolecules does have a phosphodiester bond?  
(1) Nucleic acids in a nucleotide  
(2) Fatty acids in a diglyceride  
(3) Monosaccharides in a polysaccharide  
(4) Amino acids in a polypeptide

64. The primary dentition in human differs from permanent dentition in not having the following type of teeth:  
(1) Incisors  
(2) Canine  
(3) Premolars  
(4) Molars

65. A protoplast is a cell:  
(1) without cell wall  
(2) without plasma membrane  
(3) without nucleus  
(4) undergoing division
67. In which group of organisms the cell walls form two thin overlapping shells which fit together?
   (1) Slime moulds
   (2) Chrysophytes
   (3) Euglenoids
   (4) Dinoflagellates

68. The DNA molecule to which the gene of interest is integrated or cloning is called:
   (1) Carrier
   (2) Transformer
   (3) Vector
   (4) Template

69. Male gametophyte in angiosperms produces:
   (1) Three sperms
   (2) Two sperms and a vegetative cell
   (3) Single sperm and a vegetative cell
   (4) Single sperm and two vegetative cells

70. Coconut water from a tender coconut is:
   (1) Degenerated nucleus
   (2) Immature embryo
   (3) Free nuclear endosperm
   (4) Innermost layers of the seed coat

71. The species confined to a particular region and not found elsewhere is termed as:
   (1) Rare
   (2) Keystone
   (3) Alien
   (4) Endemic

72. Metagenesis refers to:
   (1) Presence of a segmented body and parthenogenetic mode of reproduction
   (2) Presence of different morphic forms
   (3) Alternation of generation between asexual and sexual phases of an organism
   (4) Occurrence of a drastic change in form during post-embryonic development

73. The enzyme that is not present in succus entericus is:
   (1) lipase
   (2) maltase
   (3) nucleases
   (4) nucleosidase

74. Eutrophication of water bodies leading to killing of fishes is mainly due to non-availability of:
   (1) oxygen
   (2) food
   (3) light
   (4) essential minerals

75. The function of tannins is to:
   (1) stop substance from leaking across a tissue.
   (2) performing cementing to keep neighbouring cells together.
   (3) facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules.
   (4) separate two cells from each other.

76. Match the following list of microbes and their importance:

<table>
<thead>
<tr>
<th>Microbes</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sacharomyces</td>
<td>(i) Production of immunosuppressive agents</td>
</tr>
<tr>
<td>cerevisiae</td>
<td></td>
</tr>
<tr>
<td>Monascus purpureus</td>
<td>(ii) Ripening of Swiss cheese</td>
</tr>
<tr>
<td>Trichoderma</td>
<td>(iii) Commercial production of ethanol</td>
</tr>
<tr>
<td>polysporum</td>
<td></td>
</tr>
<tr>
<td>Propionibacterium</td>
<td>(iv) Production of blood-cholesterol lowering agents</td>
</tr>
<tr>
<td>shermanii</td>
<td></td>
</tr>
</tbody>
</table>

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

77. In which group of organisms the cell walls form two thin overlapping shells which fit together?
77. Arrange the following events of meiosis in correct sequence:
(a) Crossing over
(b) Synapsis
(c) Terminalisation of chiasmata
(d) Disappearance of nucleus
(1) (b), (a), (d), (c)
(2) (b), (a), (c), (d)
(3) (b), (a), (d), (c)
(4) (a), (b), (c), (d)

78. The cutting of DNA at specific locations became possible with the discovery of:
(1) Ligases
(2) Restriction enzymes
(3) Probes
(4) Selectable markers

79. During biological nitrogen fixation, inactivation of nitrogenase by oxygen poisoning is prevented by:
(1) Cytochrome
(2) Leghaemoglobin
(3) Xanthophyll
(4) Carotene

80. Grafted kidney may be rejected in a patient due to:
(1) Innate immune response
(2) Humoral immune response
(3) Cell-mediated immune response
(4) Passive immune response

81. The body cells in cockroach discharge their nitrogenous waste in the haemolymph mainly in the form of:
(1) Calcium carbonate
(2) Ammonia
(3) Potassium urate
(4) Urea

82. Filiform apparatus is characteristic feature of:
(1) Synergids
(2) Generative cell
(3) Nucellar embryo
(4) Aleuosome cell

83. Acid rain is caused by increase in the atmospheric concentration of:
(1) O₃ and dust
(2) SO₂ and NO₂
(3) SO₃ and CO
(4) CO₂ and CO

84. The wheat grain has an embryo with one shield-shaped cotyledon known as:
(1) Coleoptile
(2) Epiblast
(3) Coleorrhiza
(4) Scutellum

85. Among china rose, mustard, brinjal, potato, guava, cucumber, onion and tulip, how many have superior ovule:
(1) Four
(2) Five
(3) Six
(4) Three

86. Which of the following is not a function of the skeletal system?
(1) Locomotion
(2) Production of erythrocytes
(3) Storage of minerals
(4) Production of body heat

87. Golden rice is a genetically modified crop plant where the incorporated gene is meant for biosynthesis of:
(1) Vitamin A
(2) Vitamin B
(3) Vitamin C
(4) Omega 3

88. Chromatophores take part in:
(1) Respiration
(2) Photosynthesis
(3) Growth
(4) Movement
90. A pleiotropic gene:
(1) controls multiple traits in an individual.
(2) is expressed only in primitive plants.
(3) is a gene evolved during Pliocene.
(4) controls a trait only in combination with another gene.

91. Human urine is usually acidic because:
(1) hydrogen ions are actively secreted into the filtrate.
(2) the sodium transporter exchanges one hydrogen ion for each sodium ion, in peritubular capillaries.
(3) excreted plasma proteins are acidic.
(4) potassium and sodium exchange generates acidity.

92. Auxin can be bioassayed by:
(1) Lettuce hypocotyl elongation
(2) Avena coleoptile curvature
(3) Hydroponics
(4) Potometer

93. Which of the following events is not associated with ovulation in human female?
(1) LH surge
(2) Decrease in estradiol
(3) Full development of Graafian follicle
(4) Release of secondary oocyte

94. Body having meshwork of cells, internal cavities lined with food filtering flagellated cells and indirect development are the characteristics of phylum:
(1) Protozoa
(2) Coelenterata
(3) Porifera
(4) Mollusca

95. Which one of the following hormones is not involved in sugar metabolism? (4) Insulin
(1) Glucagon
(2) Cortisone
(3) Aldosterone
(4) Insulin

96. Outbreeding is an important strategy of animal husbandry because it:
(1) exposes harmful recessive genes that are eliminated by selection.
(2) helps in accumulation of superior genes.
(3) is useful in producing purelines of animals.
(4) is useful in overcoming inbreeding depression.

97. Which of the following diseases is caused by a protozoan?
(1) Blastomycosis
(2) Syphilis
(3) Influenza
(4) Babesiosis

98. A childless couple can be assisted to have a child through a technique called GIFT. The full form of this technique is:
(1) Germ cell internal fallopian transfer
(2) Gamete inseminated fallopian transfer
(3) Gamete internal fertilization and transfer
(4) Gamete internal fertilization and transfer

99. A jawless fish, which lays eggs in fresh water and whose ammocetes larvae after metamorphosis return to the ocean is:
(1) Petromyzon
(2) Epinephelus
(3) Myxine
(4) Neomyxine
100. The structures that help some bacteria to attach to rocks and/or host tissues are:
   (1) Holdfast
   (2) Rhizoids
   (3) Filaments
   (4) Mesoosomes

101. If you suspect major deficiency of antibodies in a person, which of the following would you look for confirmatory evidence?
   (1) Serum globulins
   (2) Fibrinogen in plasma
   (3) Serum albumins
   (4) Haemocytes

102. In human females, meiosis-II is not completed until?
   (1) birth
   (2) puberty
   (3) fertilization
   (4) uterine implantation

103. Which of the following layers in an ovary is acellular?
   (1) Zona pellucida
   (2) Granulosa
   (3) Theca interna
   (4) Stroma

104. In his classic experiments on pea plants, Mendel did not use:
   (1) Flower position
   (2) Seed colour
   (3) Pod length
   (4) Seed shape

105. Which one of the following fruits is parthenocarpic?
   (1) Banana
   (2) Brinjal
   (3) Apple
   (4) Jackfruit

106. In angiosperms, meiosis starts with:
   (1) occur in ovule
   (2) occur in ovary
   (3) form gametes without further divisions
   (4) involve meiosis

107. A gene showing codominance has:
   (1) both alleles independently expressed in the heterozygote
   (2) one allele dominant on the other
   (3) alleles tightly linked on the same chromosome
   (4) alleles that are recessive to each other

108. The chitinous exoskeleton of arthropods is formed by the polymerisation of:
   (1) lipoglycans
   (2) keratin sulphate and chondroitin sulphate
   (3) D-glucosamine
   (4) N-acetyl glucosamine

109. The imperfect fungi which are decomposers of litter and help in mineral cycling belong to:
   (1) Ascomycetes
   (2) Deu tereomi yeasts
   (3) Basidiomycetes
   (4) Phycomycetes

110. The wings of a bird and the wings of an insect are:
   (1) homologous structures and represent convergent evolution
   (2) analogous structures and represent convergent evolution
   (3) analogous structures and represent divergent evolution
   (4) phylogenetic structures and represent divergent evolution

111. Flowers are unequal in:
   (1) Onion
   (2) Pea
   (3) Cucumber
   (4) China rose
112. Increase in concentration of the taxon at successively trophic levels is known as
(1) Biochemical cycling
(2) Biomagnification
(3) Biodeterioration
(4) Biomodification

113. Destruction of the anterior horn cells of the spinal cord would result in loss of
(1) Integrate impulses
(2) Sensory impulses
(3) Voluntary motor impulses
(4) Commisural impulses

114. Roots play significant role in absorption of water in:
(1) Wheat
(2) Sunflower
(3) Pistia
(4) Pea

115. Match the columns and identify the correct option.

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Thylakoids</td>
<td>(i) Disc-shaped sacs in Golgi apparatus</td>
</tr>
<tr>
<td>(b) Cristae</td>
<td>(ii) Condensed structure of DNA</td>
</tr>
<tr>
<td>(c) Cistermae</td>
<td>(iii) Flat membranous sacs in stroma</td>
</tr>
<tr>
<td>(d) Chromatin</td>
<td>(iv) Infoldings in mitochondrial</td>
</tr>
</tbody>
</table>

116. Identify the correct order of organisation of genetic material from largest to smallest:
(1) Chromosome, genome, nucleotide, gene
(2) Chromosome, gene, genome, nucleotide
(3) Genome, chromosome, nucleotide, gene
(4) Genome, chromosome, gene, nucleotide

117. Which one of the following hormones through synthesised elsewhere, is stored and released by the master gland?
(1) Adrenocorticotropic hormone
(2) Antidiuretic hormone
(3) Luteinizing hormone
(4) Prolactin

118. Read the different components from (a) to (d) in the list given below and then the correct order of the components with reference to their arrangement from outer side to inner side in a woody diosist stem:
(a) Secondary cortex
(b) Wood
(c) Secondary phloem
(d) Phellem

The correct order is:
(1) (d), (c), (b), (a)
(2) (b), (c), (d), (a)
(3) (c), (d), (b), (a)
(4) (d), (c), (a), (b)

119. Which of the following joints would allow no movement?
(1) Ball and Socket joint
(2) Hinge joint
(3) Saddle joint
(4) Synovial joint

120. Which one of the following is not applicable to RNA?
(1) Chargaff's rule
(2) Complementary base pairing
(3) 5' phosphoryl and 3' phosphoryl ends
(4) Heterochromatin

121. Doctors use stethoscope to hear the sounds produced during each cardiac cycle. The second sound is heard when
(1) AV node receives signal from SA node
(2) AV valves open up
(3) Ventricular walls vibrate due to gushing in of blood from atria
(4) Semilunar valves close down after the blood flows into vessels from ventricles
122. During ecological succession:
(1) the changes lead to a community that is in
near equilibrium with the environment and
recalled
(2) the gradual and predictable change in species
composition occurs in a given area
(3) the establishment of a new biotic community
is very fast in its primary phase.
(4) the numbers and types of animals remain
constant.

123. In the following human pedigree, the filled symbols
represent the affected individuals. Identify the type
of given pedigree:

124. Balbiani rings are sites of:
(1) RNA and protein synthesis
(2) Lipid synthesis
(3) Nucleotide synthesis
(4) Poly saccharide synthesis

125. Name the pulmonary disease in which alveolar
sufficiency involved in gas exchange is drastically
reduced due to damage in the alveolar walls.
(1) Asthma
(2) Pleurisy
(3) Emphysema
(4) Pneumonia

126. Which of the following is the most suitable indicators
of SO2 pollution in the environment?
(1) Funghi
(2) Lichens
(3) Conifers
(4) Algae

127. Satellite DNA is important because it:
(1) codes for enzyme needed for DNA
replication.
(2) codes for proteins needed in cell cycle.
(3) shows high degree of polymorphism in
population and also the same degree of
polymorphism in an individual, which is
heritable from parents to children.
(4) does not code for protein and is same in all
members of the population.

128. Industrial melanism is an example of:
(1) Neo Lamarckism
(2) Neo Darwinism
(3) Natural selection
(4) Mutation

129. A column of water within xylem vessels of tall trees
does not break under weight because of:
(1) Positive root pressure
(2) Dissolved sugars in water
(3) Tensile strength of water
(4) Lignification of xylem vessels

130. The introduction of t-DNA into plants involves:
(1) Allowing the plant roots to stand in water
(2) Infection of the plant by Agrobacterium
(3) Altering the pH of the soil, then heat-shocking
the plants
(4) Exposing the plants to cold for a brief period

122. Athalie
123. A autosomal dominant
124. X-linked recessive
125. Emphysema
126. Conifers
127. Conifers
131. Pick up the wrong statement:
(1) Nuclear membrane is present in Monera.
(2) Cell wall is absent in Ammonia.
(3) Protists have photosynthetic and heterotrophic modes of nutrition.
(4) Some fungi are edible.

132. In photosynthesis, the light-independent reaction takes place at:
(1) Stomatal matrix
(2) Thylakoid lumen
(3) Photosystem I
(4) Photosystem II

133. Which of the following immunoglobulins constitute the largest percentage in human milk?
(1) IgG
(2) IgD
(3) IgM
(4) IgA

134. Which of the following pairs is not correctly matched?
<table>
<thead>
<tr>
<th>Mode of reproduction</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conidia</td>
<td>Penicillium</td>
</tr>
<tr>
<td>Offset</td>
<td>Water hyacinth</td>
</tr>
<tr>
<td>Rhizome</td>
<td>Banana</td>
</tr>
<tr>
<td>Binary fission</td>
<td>Sargassum</td>
</tr>
</tbody>
</table>

135. The UN conference of Parties on climate change in the year 2012 was held at:
(1) Warsaw
(2) Durban
(3) Doha
(4) Lima

136. In the spectrum of hydrogen, the ratio of the longest wavelength in the Lyman series to the longest wavelength in the Balmer series is:
(1) 5
(2) 27
(3) 4
(4) 9

137. The energy of the x-rays of the order of 15 keV. To which part of the x-rays does it belong?
(1) X-rays
(2) U.V. rays
(3) Infra-red rays
(4) Ultraviolet rays

138. An electron moves on a straight line path XY as shown. The abcd is a coil adjacent to the path of electron. What will be the direction of current, if any, induced in the coil?

139. The cylindrical tube of a spurt pump has radius R, one end of which has n fine holes, each of radius r. If the speed of the liquid in the tube X, the speed of the liquid through the holes is:
(1) \( \sqrt{\frac{R^2}{r^2}} \) nr
(2) \( \sqrt{\frac{R^2}{r^2}} \) n^2
(3) \( \sqrt{\frac{R^2}{n^2}} \) r^2
(4) \( \sqrt{\frac{R^2}{n^2}} \) r

140. The Young's modulus of steel is twice that of brass. Two wires of same length and of same area of cross section, one of steel and another of brass are suspended from the same point. If we want the lower ends of the wires to be at the same level, then the weights added to the wires in the ratio of:
(1) 1 : 1
(2) 2 : 1
(3) 1 : 2
(4) 4 : 1
141. A potentiometer wire of length L and a resistance r are connected in series with a battery of emf. E and a resistor R. An unknown emf E is balanced in a length l of the potentiometer wire. The potential difference across the galvanometer will be given by:
\[ V = \frac{E}{L} \cdot l \]
\[ I = \frac{E}{L + r} \cdot l \]
\[ V = \frac{E}{L} \cdot l \]
\[ I = \frac{E}{L + r} \cdot l \]

142. If vectors \( \mathbf{A} = \cos \omega t \mathbf{i} + \sin \omega t \mathbf{j} \) and \( \mathbf{B} = \cos \omega t \mathbf{i} + \sin \omega t \mathbf{j} \) are functions of time, then the value of t at which they are orthogonal to each other is

\[ t = \frac{\pi}{2} \]
\[ t = \frac{3\pi}{2} \]
\[ t = \pi \]
\[ t = \frac{\pi}{2} \]

143. A source of sound emitting waves of frequency 100 Hz and an observer O are located at some distance from each other. The sound is moving with a speed of 344 m/s at an angle of 60° with the source. The frequency observed by the observer (velocity of sound in air 330 m/s) is:

\[ f = \frac{v}{v - v_s} \cdot f_0 \]
\[ f = \frac{v}{v - v_s} \cdot f_0 \]
\[ f = \frac{v}{v - v_s} \cdot f_0 \]
\[ f = \frac{v}{v - v_s} \cdot f_0 \]
147. A parallel plate air capacitor has capacity \( C \), distance of separation between plates \( d \), and potential difference \( V \) is applied between the plates. Force of attraction between the plates of the parallel plate air capacitor is

\[
\frac{F}{d^2} = \frac{CV^2}{2d}
\]

(1)

\[
\frac{F}{d^2} = \frac{CV^2}{2}\]

(2)

\[
\frac{F}{d} = CV^2
\]

(3)

\[
\frac{F}{d} = dV^2
\]

(4)

148. Two vessels separately contain two ideal gases \( A \) and \( B \) at the same temperature, the pressure of being same that of \( B \). Under such conditions, the density of \( A \) is found to be 1.5 times the density of \( B \). The ratio of mean free path of \( A \) and \( B \) is

(1) \( \frac{1}{2} \)

(2) \( \frac{2}{3} \)

(3) \( \frac{3}{4} \)

(4) \( \frac{4}{5} \)

149. A satellite \( S \) is moving in an elliptical orbit around the earth. The mass of the satellite is very small compared to the mass of the earth. Then,

(1) the acceleration of \( S \) is always directed towards the centre of the earth.

(2) the angular momentum of \( S \) about the centre of the earth changes in direction, but its magnitude remains constant.

(3) the total mechanical energy of \( S \) varies periodically with time.

(4) the linear momentum of \( S \) remains constant in magnitude.

150. In the given figure, a double diode \( D \) is connected to an external resistance \( R \). The m.m.f. of 3.5 V. If the barrier potential developed across the diodes is 0.5 V, the current in the circuit will be

(1) 35 mA

(2) 30 mA

(3) 20 mA

(4) 20 mA

151. A remote-sensing satellite of earth revolves in a circular orbit at a height of 0.25 x 10^6 m above the surface of earth. If earth's radius is 6.38 x 10^6 m and \( g = 9.8 \) m/s^2, then the orbital speed of the satellite is

(1) 6.67 km/s

(2) 7.76 km/s

(3) 8.56 km/s

(4) 9.13 km/s

152. The position vector of a particle \( R \) as a function of time \( t \) is given by

\[
R = 4 \sin(2\pi t) i + 4 \cos(2\pi t) j
\]

where \( R \) in meters, \( t \) in seconds and \( i \) and \( j \) denote unit vectors along \( x \) and \( y \)-directions, respectively. Which of the following statements is wrong for the motion of particle?

(1) Path of the particle is a circle of radius 4 m.

(2) Acceleration vector \( a \) is along \(-R\).

(3) Magnitude of acceleration vector \( a \) is \( R \).

(4) Magnitude of velocity of particle is \( 8 \) meter/second.

153. A string is stretched between fixed points separated by 75.0 cm. It is observed to have resonant frequencies of 420 Hz and 375 Hz. There are no other resonant frequencies between these two. The lowest resonant frequency for this string is

(1) 105 Hz

(2) 155 Hz

(3) 205 Hz

(4) 10.5 Hz
154. Point masses \( m_1 \) and \( m_2 \) are placed at the opposite ends of a rigid rod of length \( L \), and negligible mass. The rod is to be set rotating about an axis perpendicular to it. The position of point \( P \) on this rod through which the axis should pass so that the work required to set the rod rotating with angular velocity \( \omega_0 \) is minimum, is given by:

\[
x = \frac{m_2 L}{m_1 + m_2}
\]

155. At the first minimum adjacent to the central maximum of a single-slit diffraction pattern, the phase difference between the Huygens' wavelets from the edge of the slit and the wavelet from the midpoint of the slit is:

\[
\frac{\pi}{2} \text{ radian}
\]

156. A force \( F \) is acting at a point \( P \) with coordinates \( (2, a, 3) \). The value of \( a \) for which the angular momentum about origin is conserved is:

\[
\begin{align*}
(1) & \quad 1 \\
(2) & \quad 2 \\
(3) & \quad 3 \\
(4) & \quad 0
\end{align*}
\]

157. Two points A and B move with constant velocities \( v_1 \) and \( v_2 \). At the initial instant their position vectors are \( r_1 \) and \( r_2 \), respectively. The condition for particles A and B to collide is:

\[
\begin{align*}
(1) & \quad r_1 - r_2 = v_1 - v_2 \\
(2) & \quad r_1 - r_2 = v_1 + v_2 \\
(3) & \quad r_1 = r_2 + v_1 - v_2 \\
(4) & \quad r_1 = r_2 + v_1 + v_2
\end{align*}
\]

158. A nucleus of uranium decays into nuclei of thorium and helium. Then:

\[
\begin{align*}
(1) & \quad \text{The helium nucleus has less kinetic energy than the thorium nucleus.} \\
(2) & \quad \text{The helium nucleus has more kinetic energy than the thorium nucleus.} \\
(3) & \quad \text{The helium nucleus has less momentum than the thorium nucleus.} \\
(4) & \quad \text{The helium nucleus has more momentum than the thorium nucleus.}
\end{align*}
\]

159. Two metal wires of identical dimensions are connected in series. If \( n_1 \) and \( n_2 \) are the conductivities of the metal wires respectively, the effective conductivity of the combination is:

\[
\begin{align*}
(1) & \quad \frac{1}{n_1} + \frac{1}{n_2} \\
(2) & \quad n_1 + n_2 \\
(3) & \quad n_1 + n_2 \\
(4) & \quad n_1 + n_2
\end{align*}
\]

160. Light of wavelength 500 nm is incident on a metal with work function 2.8 eV. The de Broglie wavelength of the emitted electron is:

\[
\begin{align*}
(1) & \quad \approx 2.8 \times 10^{-12} \text{ m} \\
(2) & \quad < 2.8 \times 10^{-10} \text{ m} \\
(3) & \quad < 2.8 \times 10^{-10} \text{ m} \\
(4) & \quad \approx 2.8 \times 10^{-10} \text{ m}
\end{align*}
\]
161. A plank with a box on its end is gradually raised about the other end. As the angle of inclination with the horizontal reaches 30°, the box starts to slip and slides 4.0 m down the plank in 4.0 s. The coefficients of static and kinetic friction between the box and the plank will be, respectively:

(1) 0.4 and 0.3
(2) 0.6 and 0.3
(3) 0.6 and 0.5
(4) 0.5 and 0.6

162. A series R-L circuit is connected to an alternating voltage source. Consider two situations:
(a) When capacitor is air filled.
(b) When capacitor is filled.
Current through resistor is I and voltage across capacitor is V then:

(1) \( V = V_0 \)
(2) \( V = V_0 \)
(3) \( V > V_0 \)
(4) \( V < V_0 \)

163. The coefficient of static and kinetic friction between the box and the plank will be, respectively:

164. Two stones of masses m and 2m are whirled in horizontal circles, the heavier one in a radius \( \frac{2}{3} \) and the lighter one in radius r. The tangential speed of lighter stone is \( \frac{1}{2} \) times that of the heavier stone when they experience same centripetal forces. The value of n is:

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

165. The coefficient of performance of a refrigerator is 5. The temperature inside freezer is \( -20°C \), the temperature of the surroundings to which heat is:

(1) 25°C
(2) 31°C
(3) 41°C
(4) 47°C

166. An ideal gas is compressed to half its initial volume by means of several processes. Which of the process results in the minimum work done on the gas?

(1) Isothermal
(2) Adiabatic
(3) Isochoric
(4) Isothermal

167. A ball is thrown vertically downwards from a height of 20 m with an initial velocity \( v_0 \). It collides with the ground, loses 50 percent of its energy in collision and rebounds to the same height. The initial velocity \( v_0 \) is:

(1) 10 ms\(^{-1} \)
(2) 14 ms\(^{-1} \)
(3) 20 ms\(^{-1} \)
(4) 26 ms\(^{-1} \)

168. On a frictionless surface, a block of mass M moving with speed \( v \) collides elastically with another block of same mass M which is initially at rest. After collision, the first block moves at an angle \( \theta \) to its initial direction and has a speed \( \frac{v}{2} \). The second block's speed after the collision is:

(1) \( \frac{\sqrt{3}v}{2} \)
(2) \( \frac{2v}{3} \)
(3) \( \frac{v}{2} \)
(4) \( \frac{3v}{4} \)

169. If potential (in volts) in a region is expressed as \( V(x, y, z) = 6x - 3y + 2z \), the electric field (in V/C) at point \( (1, 1, 0) \) is:

(1) \( (0, 6, 2) \)
(2) \( (-3, 5, 2) \)
(3) \( (-6, 5, 2) \)
(4) \( (0, 3, 5) \)

170. For a given medium, the velocity of sound in air is \( 340 \text{ m/s} \). The velocity of sound in water is:

(1) \( 340 \text{ m/s} \)
(2) \( 1400 \text{ m/s} \)
(3) \( 1000 \text{ m/s} \)
(4) \( 400 \text{ m/s} \)
170. Two slits in Young's experiment have widths in the ratio 1 : 25. The ratio of intensity at the maxima and minima in the interference pattern is: 

(1) 4 : 1
(2) 9 : 1
(3) 121 : 1
(4) 49 : 1

171. The heart of a man pumps 5 litres of blood through the arteries per minute at a pressure of 150 mm of mercury. If the density of mercury is 13.6 × 10^3 kg/m³ and g = 10 m/s², then the power of heart is:

(1) 1.50
(2) 1.70
(3) 2.35
(4) 3.0

172. A proton and an alpha particle both enter a region of uniform magnetic field B, moving at right angles to the field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by proton is 1 MeV, the energy acquired by alpha particle will be:

(1) 1 MeV
(2) 4 MeV
(3) 0.5 MeV
(4) 1.5 MeV

173. The input signal given to an amplifier having a voltage gain of 150 is 

\[ V_i = 2 \cos \left( 15 \pi t + \frac{2 \pi}{3} \right) \]

The corresponding output signal will be:

(1) \[ 300 \cos \left( 15 \pi t + \frac{4 \pi}{3} \right) \]
(2) \[ 300 \cos \left( 15 \pi t + \frac{\pi}{3} \right) \]
(3) \[ 75 \cos \left( 15 \pi t + \frac{2 \pi}{3} \right) \]
(4) \[ 2 \cos \left( 15 \pi t + \frac{5 \pi}{6} \right) \]

174. If dimensions of critical velocity \( u_c \) of a liquid flowing through a tube are expressed as \([\text{m/s} \times \text{m}]^2\), where \( u_c \) and \( d \) are the critical velocity of liquid, density of liquid and radius of the tube respectively, then the values of \( u \) and \( d \) are given by:

(1) 1, 1
(2) 1, 1
(3) 1, 1
(4) 1, 1

175. A circuit contains an ammeter of 30 V and a resistance of 10 Ω connected in series. If the ammeter has a coil of resistance 0.4 Ω and a shunt of 2.0 Ω, the reading in the ammeter will be:

(1) 1 A
(2) 0.5 A
(3) 0.25 A
(4) 0.05 A

176. Water rises to a height \( h \) in a capillary tube. If the length of the capillary tube above the surface of water is made less than \( h \), then:

(1) water does not rise at all.
(2) water rises to the tip of capillary tube and then stays there without overflowing.
(3) water rises to the tip of capillary tube and then starts overflowing like a fountain.
(4) water rises up but a point a little below the top and then stays there.

177. In an astronomical telescope in normal adjustment a straight black line of length 1, is drawn on inside part of objective lens. The eye-piece forms a real image of this line. The length of this image is 3. The magnification of the telescope is:

(1) \[ \frac{1}{2} \]
(2) \[ \frac{1}{2} \]
(3) \[ \frac{1}{2} \]
(4) \[ \frac{1}{2} \]
178. The value of coefficient of volume expansion of glycerin is $8.5 \times 10^{-3} \text{K}^{-1}$. The fractional change in the density of glycerin for a rise of 30°C in its temperature is:

- (1) 0.010
- (2) 0.015
- (3) 0.020
- (4) 0.025

179. A photoelectric surface is illuminated successively by monochromatic light of wavelength $\lambda$ and $2\lambda$. If the maximum kinetic energy of the emitted photoelectrons in the second case is 3 times that in the first case, the work function of the surface of the material is:

$h = \text{Planck's constant, } c = \text{speed of light}$

- (1) $\frac{hc}{3\lambda}$
- (2) $c\lambda$
- (3) $\lambda$
- (4) $\frac{2hc}{\lambda}$

180. A beam of light consisting of red, green and blue colours is incident on a right angled prism. The refractive index of the material of the prism for the above red, green and blue wavelengths are 1.39, 1.44 and 1.47, respectively.

- (1) separate the red colour part from the green and blue colours
- (2) separate the blue colour part from the red and green colours
- (3) separate all the three colours from one another
- (4) not separate the three colours at all