

Time: 3 Hrs.

M.M- 720

General Instructions

- There are three Sections.
- Section of Physics and Chemistry will have 45 questions.
- Section of Biology will have 90 questions.
- Each question carries 4 marks. There will be negative marking of one mark for each incorrect answer.

NEET (September 2022)

1. An example of colonial alga is
(a) *Volvox* (b) *Ulothrix*
(c) *Spirogyra* (d) *Chlorella*. (NEET 2017)
2. Select the mismatch.
(a) *Cycas* – Dioeciouss
(b) *Salvinia* – Heterosporous
(c) *Equisetum* – Homosporous
(d) *Pinus* – Dioecious
3. Zygotic meiosis is characteristic of
(a) *Fucus* (b) *Funaria*
(c) *Chlamydomonas* (d) *Marchantia*.
4. Life cycles of *Ectocarpus* and *Fucus* respectively are
(a) diplontic, haplodiplontic
(b) haplodiplontic, diplontic
(c) haplodiplontic, haplontic
(d) haplontic, diplontic.
5. Conifers are adapted to tolerate extreme environmental conditions because of
(a) broad hardy leaves
(b) superficial stomata
(c) thick cuticle
(d) presence of vessels.
6. Which one of the following statements is wrong?
(a) Algae increase the level of dissolved oxygen in the immediate environment.
(b) Algin is obtained from red algae, and carrageenan from brown algae.
(c) Agar-agar is obtained from *Gelidium* and *Gracilaria*.
(d) *Laminaria* and *Sargassum* are used as food.
7. Select the correct statement.
(a) *Sequoia* is one of the tallest trees.
(b) The leaves of gymnosperms are not well adapted to extremes of climate.
(c) Gymnosperms are both homosporous and heterosporous.
(d) *Salvinia*, *Ginkgo* and *Pinus* all are gymnosperms
8. In bryophytes and pteridophytes, transport of male gametes requires
(a) birds (b) water
(c) wind (d) insects.

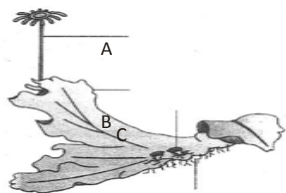
9. Which one of the following statements is wrong?
 (a) *Chlorella* and *Spirulina* are used as space food.
 (b) Mannitol is stored food in Rhodophyceae.
 (c) Algin and carrageenan are products of algae.
 (d) Agar-agar is obtained from *Gelidium* and *Gracilaria*.
10. In which of the following, gametophyte is not independent free living?
 (a) *Pteris* (b) *Pinus*
 (c) *Funaria* (d) *Marchantia*
11. Read the following five statements (A to E) and select the option with all correct statements.
 A. Mosses and lichens are the first organisms to colonise a bare rock.
 B. *Selaginella* is a homosporous pteridophyte.
 C. Coralloid roots in *Cycas* have VAM.
 D. Main plant body in bryophytes is gametophytic, whereas in pteridophytes it is sporophytic.
 E. In gymnosperms, male and female gametophytes are present within sporangia located on sporophyte.
 (a) A, D and E (b) B, C and E
 (c) A, C and D (d) B, C and D
12. Male gametes are flagellated in
 (a) *Ectocarpus* (b) *Spirogyra*
 (c) *Polysiphonia* (d) *Anabaena*.
13. Which one of the following is wrong about *Chara*?
 (a) Upper oogonium and lower round antheridium
 (b) Globule and nucule present on the same plant
 (c) Upper antheridium and lower oogonium
 (d) Globule is male reproductive structure
14. Which of the following is responsible for peat formation?
 (a) *Marchantia* (b) *Riccia*
 (c) *Funaria* (d) *Sphagnum*
15. Male gametophyte with least number of cells is present in
 (a) *Pteris* (b) *Funaria*
 (c) *Lilium* (d) *Pinus*.
16. Select the wrong statement.
 (a) In Oomycetes, female gamete is smaller and motile, while male gamete is larger and non-motile.
 (b) *Chlamydomonas* exhibits both isogamy and anisogamy and *Fucus* shows oogamy.
 (c) Isogametes are similar in structure, function and behaviour.
 (d) Anisogametes differ either in structure, function or behaviour.
17. Isogamous condition with non-flagellated gametes is found in
 (a) *Volvox* (b) *Fucus*
 (c) *Chlamydomonas* (d) *Spirogyra*.
18. Monoecious plant of *Chara* shows occurrence of
 (a) upper antheridium and lower oogonium on the same plant
 (b) upper oogonium and lower antheridium on the same plant
 (c) antheridiophore and archegoniophore on the same plant
 (d) stamen and carpel on the same plant.

19. Read the following statements (A - E) and answer the question which follows them.
- (A) In liverworts, mosses and ferns gametophytes are free-living.
 - (B) Gymnosperms and some ferns are heterosporous.
 - (C) Sexual reproduction in *Fucus*, *Volvox* and *Albugo* is oogamous.
 - (D) The sporophyte in liverworts is more elaborate than that in mosses.
 - (E) Both, *Pinus* and *Marchantia* are dioecious. How many of the above statements are correct?
- (a) Three (b) Four
 - (c) One (d) Two
20. Syngamy can occur outside the body of the organism in
- (a) mosses (b) algae
 - (c) ferns (d) fungi.
21. What is common in all the three, *Funaria*, *Dryopteris* and *Ginkgo*?
- (a) Presence of archegonia
 - (b) Well developed vascular tissues
 - (c) Independent gametophyte
 - (d) Independent sporophyte
22. Which one of the following is wrongly matched?
- (a) *Spirogyra* - Motile gametes
 - (b) *Sargassum* - Chlorophyll
 - (c) Basidiomycetes - Puffballs
 - (d) *Nostoc* - Water blooms
23. The plant body is thalloid in
- (a) *Sphagnum* (b) *Salvinia*
 - (c) *Marchantia* (d) *Funaria*.
24. Which one of the following is common to multicellular fungi, filamentous algae and protonema of mosses?
- (a) Diplontic life cycle
 - (b) Members of Kingdom Plantae
 - (c) Mode of nutrition
 - (d) Multiplication by fragmentation
25. Which one of the following is a correct statement?
- (a) Pteridophyte gametophyte has a protonemal and leafy stage.
 - (b) In gymnosperms, female gametophyte is free-living.
 - (c) Antheridiophores and archegoniophores are present in pteridophytes.
 - (d) Origin of seed habit can be traced in pteridophytes.
26. *Cycas* and *Adiantum* resemble each other in having
- (a) seeds (b) motile sperms
 - (c) cambium (d) vessels.
27. Which one of the following pairs is wrongly matched?
- (a) *Ginkgo* - Archegonia
 - (b) *Salvinia* - Prothallus
 - (c) Viroids - RNA
 - (d) Mustard - Synergids

28. Read the following five statements (A - E) and answer as asked next to them.
 (A) In *Equisetum*, the female gametophyte is retained on the parent sporophyte.
 (B) In *Ginkgo*, male gametophyte is not independent.
 (C) The sporophyte in *Riccia* is more developed than that in *Polytrichum*.
 (D) Sexual reproduction in *Volvox* is isogamous.
 (E) The spores of slime moulds lack cell walls.

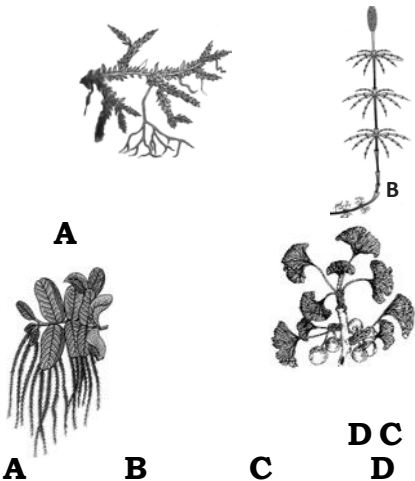
How many of the above statements are correct?

- (a) Two (b) Three
 (c) Four (d) One
29. How many organisms in the list given below are autotrophs?
Lactobacillus, *Nostoc*, *Chara*, *Nitrosomonas*, *Nitrobacter*, *Streptomyces*,
Saccharomyces, *Trypanosoma*, *Porphyra*, *Wolffia*
- (a) Four (b) Five
 (c) Six (d) Three
30. The gametophyte is not an independent, free- living generation in
 (a) *Polytrichum* (b) *Adiantum*
 (c) *Marchantia* (d) *Pinus*.
31. Compared with the gametophytes of the bryophytes, the gametophytes of vascular plants tend to be
 (a) smaller but to have larger sex organs
 (b) larger but to have smaller sex organs
 (c) larger and to have larger sex organs
 (d) smaller and to have smaller sex organs.
32. Archegoniophore is present in
 (a) *Marchantia* (b) *Chara*
 (c) *Adiantum* (d) *Funaria*.
33. A prokaryotic autotrophic nitrogen fixing symbiont is found in
 (a) *Alnus* (b) *Cycas*
 (c) *Cicer* (d) *Pisum*.
34. Examine the figure given below and select the correct option giving all the four parts (A, B, C and D) rightly identified.



- | | | | | | | | |
|-----|-----------|--------------|----------|----------|---------|---------|----------|
| | A | B | C | D | | | D |
| (a) | Archego- | Female Gemma | Rhizoids | niophore | thallus | | cup |
| (b) | Archego- | Female Bud | Foot | niophore | thallus | | |
| (c) | Seta | Sporo-Proto- | Rhizoids | | | | |
| | | phyte | nema | | | | |
| (d) | Antherid- | Male- | Globule | Roots | iophore | thallus | |

35. *Selaginella* and *Salvinia* are considered to represent a significant step toward evolution of seed habit because
- female gametophyte is free and gets dispersed like seeds.
 - female gametophyte lacks archegonia.
 - megaspores possess endosperm and embryo surrounded by seed coat.
 - embryo develops in female gametophyte which is retained on parent sporophyte.
36. Consider the following four statements whether they are correct or wrong.
- The sporophyte in liverworts is more elaborate than that in mosses.
 - Salvinia* is heterosporous.
 - The life-cycle in all seed-bearing plants is diplontic.
 - In *Pinus* male and female cones are borne on different trees.
- The two wrong statements together are
- A and C
 - A and D
 - B and C
 - A and B.
37. Algae have cells made up of
- cellulose, galactans and mannans
 - hemicellulose, pectins and proteins
 - pectins, cellulose and proteins
 - cellulose, hemicellulose and pectins.
38. Male and female gametophytes are independent and free-living in
- mustard
 - castor
 - Pinus*
 - Sphagnum*.
39. Which one of the following is monoecious?
- Marchantia*
 - Cycas*
 - Pinus*
 - Date palm
40. Examine the figures A, B, C and D. In which one of the four options all the items A, B, C and D are correct?



- Chara* *Marchantia* *Fucus* *Pinus*
- Equisetum* *Ginkgo* *Selaginella* *Lycopodium*
- Selaginella* *Equisetum* *Salvinia* *Ginkgo*
- Funaria* *Adiantum* *Salvinia* *Riccia*

41. Which one of the following is a vascular cryptogam?
- Ginkgo*
 - Marchantia*
 - Cedrus*
 - Equisetum*

42. Mannitol is the stored food in
(a) *Porphyra* (b) *Fucus*
(c) *Gracillaria* (d) *Chara*.
43. Which one of the following is considered important in the development of seed habit?
(a) Heterospory
(b) Haplontic life cycle
(c) Free-living gametophyte
(d) Dependent sporophyte
44. Which one of the following has haplontic life cycle?
(a) *Polytrichum* (b) *Ustilago*
(c) Wheat (d) *Funaria*
45. Which one of the following plants is monoecious?
(a) *Pinus* (b) *Cycas*
(c) Papaya (d) *Marchantia*
46. Select one of the following pairs of important features distinguishing *Gnetum* from *Cycas* and *Pinus* and showing affinities with angiosperms.
(a) Perianth and two integuments
(b) Embryo development and apical meristem
(c) Absence of resin duct and leaf venation
(d) Presence of vessel elements and absence of archegonia
47. In which one of the following male and female gametophytes do not have free living independent existence?
(a) *Polytrichum* (b) *Cedrus*
(c) *Pteris* (d) *Funaria*
48. Which one of the following is heterosporous?
(a) *Adiantum* (b) *Equisetum*
(c) *Dryopteris* (d) *Salvinia*
49. In gymnosperms, the pollen chamber represents
(a) a cavity in the ovule in which pollen grains are stored after pollination
(b) an opening in the megagametophyte through which the pollen tube approaches the egg
(c) the microsporangium in which pollen grains develop
(d) a cell in the pollen grain in which the sperms are formed.
50. Spore dissemination in some liverworts is aided by
(a) indusium (b) calyptra
(c) peristome teeth (d) elaters.
51. Flagellated male gametes are present in all the three of which one of the following sets?
(a) *Zygnema*, *Saprolegnia* and *Hydrilla*
(b) *Fucus*, *Marsilea* and *Calotropis*
(c) *Riccia*, *Dryopteris* and *Cycas*
(d) *Anthoceros*, *Funaria* and *Spirogyra*

52. If you are asked to classify the various algae into distinct groups, which of the following characters you should choose?
- Nature of stored food materials in the cell
 - Structural organization of thallus
 - Chemical composition of the cell wall
 - Types of pigments present in the cell
53. In the prothallus of a vascular cryptogam, the antherozoids and eggs mature at different times.
As a result
- there is high degree of sterility
 - one can conclude that the plant is apomictic
 - self fertilization is prevented
 - there is no change in success rate of fertilization.
54. Peat moss is used as a packing material for sending flowers and live plants to distant places because
- it serves as a disinfectant
 - it is easily available
 - it is hygroscopic
 - it reduces transpiration
55. Conifers differ from grasses in the
- formation of endosperm before fertilization
 - production of seeds from ovules
 - lack of xylem tracheids
 - absence of pollen tubes.
56. In a moss, the sporophyte
- manufactures food for itself, as well as for the gametophyte
 - is partially parasitic on the gametophyte
 - produces gametes that give rise to the gametophyte
 - arises from a spore produced from the gametophyte.
57. Auxospores and hormogonia are formed, respectively, by
- some diatoms and several cyanobacteria
 - some cyanobacteria and many diatoms
 - several cyanobacteria and several diatoms
 - several diatoms and a few cyanobacteria.
58. Ectophloic siphonostele is found in
- Osmunda* and *Equisetum*
 - Marsilea* and *Botrychium*
 - Adiantum* and *Cucurbitaceae*
 - Dicksonia* and *Maiden hair fern*.
59. Match items in column I with those in column II.

Column I	Column II
(A) Peritrichous flagellation	(J) <i>Ginkgo</i>
(B) Living fossil	(K) <i>Macrocystis</i>
(C) Rhizophore	(L) <i>Escherichia coli</i>
(D) Smallest flowering plant	(M) <i>Selaginella</i>

(E) Largest
perennial alga

(N) *Wolffia*

Select the correct answer from the following.

- (a) A - L; B - J; C - M; D - N; E - K
- (b) A - K; B - J; C - L; D - M; E - N
- (c) A - N; B - L; C - K; D - N; E - J
- (d) A - J; B - K; C - N; D - L; E - K

60. Top-shaped multiciliate male gametes and the mature seed which bears only one embryo with two cotyledons, are characterised features of
- (a) cycads
 - (b) conifers
 - (c) polypetalous angiosperms
 - (d) gamopetalous angiosperms
61. Diversification in plant life appeared
- (a) due to long periods of evolutionary changes
 - (b) due to abrupt mutations
 - (c) suddenly on earth
 - (d) by seed dispersal.
62. Angiosperms have dominated the land flora primarily because of their
- (a) power of adaptability in diverse habitat
 - (b) property of producing large number of seeds
 - (c) nature of self pollination
 - (d) domestication by man.
63. Which one of the following pairs of plants are not seed producers ?
- (a) Fern and *Funaria*
 - (b) *Funaria* and *Ficus*
 - (c) *Ficus* and *Chlamydomonas*
 - (d) *Funaria* and *Pinus*
64. Sexual reproduction in *Spirogyra* is an advanced feature because it shows
- (a) different sizes of motile sex organs
 - (b) same size of motile sex organs
 - (c) morphologically different sex organs
 - (d) physiologically differentiated sex organs.
65. Plants reproducing by spores such as mosses and ferns are grouped under the general term
- (a) cryptogams (b) bryophytes
 - (c) sporophytes (d) thallophytes.
66. Which one pair of examples will correctly represent the grouping spermatophyta according to one of the schemes of classifying plants ?
- (a) *Acacia*, sugarcane
 - (b) *Pinus*, *Cycas*
 - (c) *Rhizopus*, *Triticum*
 - (d) *Ginkgo*, *Pisum*

67. Which of the following is without exception in angiosperms?
(a) Presence of vessels
(b) Double fertilisation
(c) Secondary growth
(d) Autotrophic nutrition
68. Which of the following plants produces seeds but not flowers?
(a) Maize (b) Mint
(c) Peepal (d) *Pinus*
69. *Cycas* has two cotyledons but not included in angiosperms because of
(a) naked ovules
(b) seems like monocot
(c) circinate ptyxis
(d) compound leaves.
70. A student observed an algae with chlorophyll *a*, *b* and phycoerythrin, it should belong to
(a) Phaeophyta (b) Rhodophyta
(c) Chlorophyta (d) Bacillariophyta.
71. In ferns, meiosis takes place at the time of
(a) spore formation
(b) spore germination
(c) gamete formation
(d) antheridia and archegonia formation.
72. Plant group with largest ovule, largest tree, and largest gametes is
(a) gymnosperm (b) angiosperm
(c) bryophyta (d) pteridophyta
73. The antherozoids of *Funaria* are
(a) multiciliated (b) monociliated
(c) aciliated (d) biciliated.
74. Bryophytes comprise
(a) dominant phase of gametophyte which produces spores
(b) small sporophyte phase and generally parasitic on gametophyte
(c) sporophyte is of longer duration
(d) dominant phase of sporophyte which is parasitic.
75. In which of the following would you place the plants having vascular tissue lacking seeds?
(a) Pteridophytes (b) Gymnosperms
(c) Algae (d) Bryophytes
76. Which of the following is true about bryophytes?
(a) They are thalloid.
(b) They possess archegonia.
(c) They contain chloroplast.
(d) All of these
77. Dichotomous branching is found in
(a) liverworts (b) pteridophytes
(c) fern (d) *Funaria*.

78. Which one of the following statements about *Cycas* is incorrect?
- (a) It has circinate vernation.
 - (b) Its xylem is mainly composed of xylem vessel.
 - (c) Its roots contain some blue-green algae.
 - (d) It does not have a well organized female flower.
79. Largest sperms in the plants world are found in
- (a) Banyan
 - (b) *Cycas*
 - (c) *Thuja*
 - (d) *Pinus*.
80. *Ulothrix* can be described as a
- (a) filamentous alga lacking flagellated reproductive stages
 - (b) membranous alga producing zoospores
 - (c) filamentous alga with flagellated reproductive stages
 - (d) non-motile colonial alga lacking zoospores.
81. Bryophytes are dependent on water, because
- (a) water is essential for their vegetative propagation
 - (b) the sperms can easily reach upto egg in the archegonium
 - (c) archegonium has to remain filled with water for fertilization
 - (d) water is essential for fertilization for their homosporous nature
82. The walking fern is so named because
- (a) it propagates vegetatively by its leaf tips
 - (b) it knows how to walk by itself
 - (c) its spores are able to walk
 - (d) it is dispersed through the agency of walking animals.
83. Transfusion tissue is present in the leaves of
- (a) *Pinus*
 - (b) *Dryopteris*
 - (c) *Cycas*
 - (d) both (a) and (c).
84. Heterospory and seed habit are often exhibited by a plant possessing
- (a) petiole
 - (b) ligule
 - (c) bract
 - (d) spathe.
85. An alga, very rich in protein, is
- (a) *Chlorella*
 - (b) *Nostoc*
 - (c) *Spirogyra*
 - (d) *Ulothrix*.
86. Bryophytes can be separated from algae, because they
- (a) possess archegonia
 - (b) contain chloroplast
 - (c) are thalloid forms
 - (d) have no conducting tissue.
87. Multicellular branched rhizoids and leafy gametophytes are the characteristics of
- (e) some bryophytes
 - (b) pteridophytes
 - (c) all bryophytes
 - (d) gymnosperms.
88. Brown algae is characterised by the presence of
- (f) fucoxanthin
 - (b) haematochrome
 - (c) phycoyanin
 - (d) phycoerythrin.

89. The smallest plant family 'Gymnosperm' has how many species?
 (a) 640 (b) 300
 (c) 1000 (d) 900
90. Elater mechanism for spore dispersal is exhibited by
 (a) liverworts (b) *Marchantia*
 (c) *Riccia* (d) *Funaria*.

Physics

91. with an acceleration of 5 ms^{-2} . Taking g to be 10 ms^{-2} , then the tension in the cable is
 (a) 6000 N (b) 9000 N
 (c) 60000 N (d) 90000 N
92. A ball of mass 0.2 kg moves with a velocity of 20 m/sec and it stops in 0.1 sec ; then the force on the ball is
 (a) 40 N (b) 20 N
 (c) 4 N (d) 2 N
93. A vehicle of 100 kg is moving with a velocity of 5 m/sec . To stop it in $\frac{1}{10}$ sec , the required force in opposite direction is
 (a) 5000 N (b) 500 N
 (c) 50 N (d) 1000 N
94. A boy having a mass equal to 40 $kilograms$ is standing in an elevator. The force felt by the feet of the boy will be greatest when the elevator
 ($g = 9.8\text{ metres/sec}^2$)
 (a) Stands still
 (b) Moves downward at a constant velocity of 4 $metres/sec$
 (c) Accelerates downward with an acceleration equal to 4 $metres/sec^2$
 (d) Accelerates upward with an acceleration equal to 4 $metres/sec^2$
95. A rocket has an initial mass of $20 \times 10^3\text{ kg}$. If it is to blast off with an initial acceleration of 4 ms^{-2} , the initial thrust needed is ($g \cong 10\text{ ms}^{-2}$)
 (a) $6 \times 10^4\text{ N}$ (b) $28 \times 10^4\text{ N}$
 (c) $20 \times 10^4\text{ N}$ (d) $12 \times 10^4\text{ N}$
96. The ratio of the weight of a man in a stationary lift and when it is moving downward with uniform acceleration ' a ' is 3 : 2. The value of ' a ' is (g -Acceleration due to gravity of the earth)
 (a) $\frac{3}{2}g$ (b) $\frac{g}{3}$
 (c) $\frac{2}{3}g$ (d) g
97. The mass of a lift is 500 kg . When it ascends with an acceleration of 2 m/s^2 , the tension in the cable will be [$g = 10\text{ m/s}^2$]
 (a) 6000 N (b) 5000 N
 (c) 4000 N (d) 50 N

98. If force on a rocket having exhaust velocity of 300 m/sec is 210 N , then rate of combustion of the fuel is
 (a) 0.7 kg/s (b) 1.4 kg/s
 (c) 0.07 kg/s (d) 10.7 kg/s
99. In an elevator moving vertically up with an acceleration g , the force exerted on the floor by a passenger of mass M is
 (a) Mg (b) $\frac{1}{2}Mg$
 (c) Zero (d) $2Mg$
100. A mass 1 kg is suspended by a thread. It is
 (i) lifted up with an acceleration 4.9 m/s^2
 (ii) lowered with an acceleration 4.9 m/s^2 .
 The ratio of the tensions is
 (a) $3 : 1$ (b) $1 : 3$
 (c) $1 : 2$ (d) $2 : 1$
101. A 5000 kg rocket is set for vertical firing. The exhaust speed is 800 ms^{-1} . To give an initial upward acceleration of 20 ms^{-2} , the amount of gas ejected per second to supply the needed thrust will be ($g = 10 \text{ ms}^{-2}$)
 (a) 127.5 kg s^{-1} (b) 187.5 kg s^{-1}
 (c) 185.5 kg s^{-1} (d) 137.5 kg s^{-1}
102. If a person with a spring balance and a body hanging from it goes up and up in an aeroplane, then the reading of the weight of the body as indicated by the spring balance will
 (a) Go on increasing
 (b) Go on decreasing
 (c) First increase and then decrease
 (d) Remain the same
103. The time period of a simple pendulum measured inside a stationary lift is found to be T . If the lift starts accelerating upwards with an acceleration $g/3$, the time period is
 (a) $T\sqrt{3}$ (b) $T\sqrt{3}/2$
 (c) $T/\sqrt{3}$ (d) $T/3$
104. A cork is submerged in water by a spring attached to the bottom of a pail. When the pail is kept in a elevator moving with an acceleration downwards, the spring length
 (a) Increases (b) Decreases
 (c) Remains unchanged (d) Data insufficient

105. Two trolleys of mass m and $3m$ are connected by a spring. They were compressed and released once, they move off in opposite direction and comes to rest after covering distances s_1 and s_2 respectively. Assuming the coefficient of friction to be uniform, the ratio of distances $s_1 : s_2$ is

- (a) 1 : 9 (b) 1 : 3
 (c) 3 : 1 (d) 9 : 1

106. A boy of 50 kg is in a lift moving down with an acceleration 9.8 ms^{-2} . The apparent weight of the body is ($g = 9.8 \text{ ms}^{-2}$)

- (a) $50 \times 9.8 \text{ N}$ (b) Zero
 (c) 50 N (d) $\frac{50}{9.8} \text{ N}$

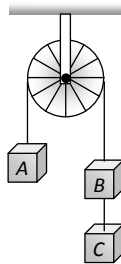
107. A block of mass M is pulled along a horizontal frictionless surface by a rope of mass m . If a force P is applied at the free end of the rope, the force exerted by the rope on the block will be

- (a) P (b) $\frac{Pm}{M+m}$
 (c) $\frac{PM}{M+m}$ (d) $\frac{Pm}{M-m}$

108. A rope of length L is pulled by a constant force F . What is the tension in the rope at a distance x from the end where the force is applied

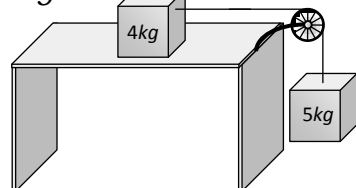
- (a) $\frac{FL}{x}$ (b) $\frac{F(L-x)}{L}$
 (c) $\frac{FL}{L-x}$ (d) $\frac{Fx}{L-x}$

109. Three equal weights A , B and C of mass 2 kg each are hanging on a string passing over a fixed frictionless pulley as shown in the figure The tension in the string connecting weights B and C is



- (a) Zero
 (b) 13 N
 (c) 3.3 N
 (d) 19.6 N

110. Two masses of 4 kg and 5 kg are connected by a string passing through a frictionless pulley and are kept on a frictionless table as shown in the figure. The acceleration of 5 kg mass is



- (a) 49 m/s^2
 (b) 5.44 m/s^2
 (c) 19.5 m/s^2
 (d) 2.72 m/s^2

111. Two masses 2 kg and 3 kg are attached to the end of the string passed over a pulley fixed at the top. The tension and acceleration are

(a) $\frac{7g}{8}; \frac{g}{8}$ (b) $\frac{21g}{8}; \frac{g}{8}$

(c) $\frac{21g}{8}; \frac{g}{5}$ (d) $\frac{12g}{5}; \frac{g}{5}$

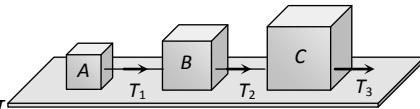
112. Three blocks A, B and C weighing $1, 8$ and 27 kg respectively are connected as shown in the figure with an inextensible string and are moving on a smooth surface. T_3 is equal to 36 N . Then T_2 is

(a) 18 N

(b) 9 N

(c) 3.375 N

(d) 1.25 N



113. Two bodies of mass 3 kg and 4 kg are suspended at the ends of massless string passing over a frictionless pulley. The acceleration of the system is ($g = 9.8\text{ m/s}^2$)

(a) 4.9 m/s^2

(b) 2.45 m/s^2

(c) 1.4 m/s^2

(d) 9.5 m/s^2

114. Three solids of masses m_1, m_2 and m_3 are connected with weightless string in succession and are placed on a frictionless table. If the mass m_3 is dragged with a force T , the tension in the string between m_2 and m_3 is

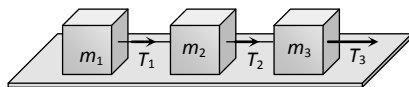
(a) $\frac{m_2}{m_1 + m_2 + m_3} T$

(b) $\frac{m_3}{m_1 + m_2 + m_3} T$

(c) $\frac{m_1 + m_2}{m_1 + m_2 + m_3} T$

(d) $\frac{m_2 + m_3}{m_1 + m_2 + m_3} T$

115. Three blocks of masses m_1, m_2 and m_3 are connected by massless strings as shown on a frictionless table. They are pulled with a force $T_3 = 40\text{ N}$. If $m_1 = 10\text{ kg}, m_2 = 6\text{ kg}$ and $m_3 = 4\text{ kg}$, the tension T_2 will be



(a) 20 N

(b) 40 N

(c) 10 N

(d) 32 N

116. A block of mass m_1 rests on a horizontal table. A string tied to the block is passed on a frictionless pulley fixed at the end of the table and to the other end of string is hung another block of mass m_2 . The acceleration of the system is

(a) $\frac{m_2 g}{(m_1 + m_2)}$

(b) $\frac{m_1 g}{(m_1 + m_2)}$

(c) g

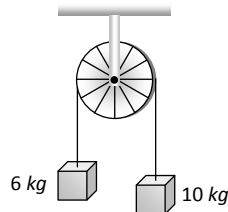
(d) $\frac{m_2 g}{m_1}$

117. A 2 kg block is lying on a smooth table which is connected by a body of mass 1 kg by a string which passes through a pulley. The 1 kg mass is hanging vertically. The acceleration of block and tension in the string will be

- (a) $3.27\text{ m/s}^2, 6.54\text{ N}$ (b) $4.38\text{ m/s}^2, 6.54\text{ N}$
 (c) $3.27\text{ m/s}^2, 9.86\text{ N}$ (d) $4.38\text{ m/s}^2, 9.86\text{ N}$

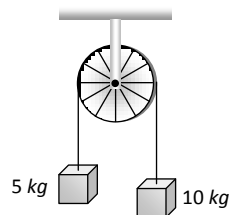
118. A light string passes over a frictionless pulley. To one of its ends a mass of 6 kg is attached. To its other end a mass of 10 kg is attached. The tension in the thread will be

- (a) 24.5 N
 (b) 2.45 N
 (c) 79 N
 (d) 73.5 N



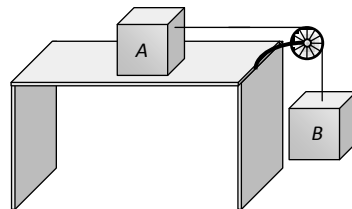
119. Two masses of 5 kg and 10 kg are connected to a pulley as shown. What will be the acceleration of the system ($g = \text{acceleration due to gravity}$)

- (a) g
 (b) $\frac{g}{2}$
 (c) $\frac{g}{3}$
 (d) $\frac{g}{4}$



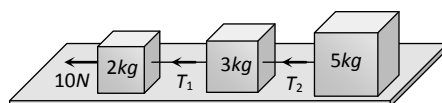
120. A block A of mass 7 kg is placed on a frictionless table. A thread tied to it passes over a frictionless pulley and carries a body B of mass 3 kg at the other end. The acceleration of the system is (given $g = 10\text{ ms}^{-2}$)

- (a) 100 ms^{-2}
 (b) 3 ms^{-2}
 (c) 10 ms^{-2}
 (d) 30 ms^{-2}



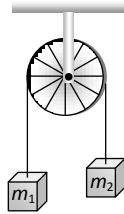
121. Three blocks of masses 2 kg , 3 kg and 5 kg are connected to each other with light string and are then placed on a frictionless surface as shown in the figure. The system is pulled by a force $F = 10\text{ N}$, then tension $T_1 =$

- (a) 1 N
 (b) 5 N
 (c) 8 N
 (d) 10 N



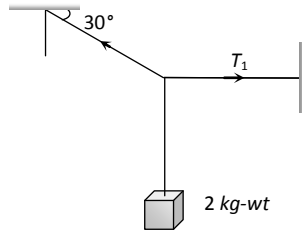
122. Two masses m_1 and m_2 are attached to a string which passes over a frictionless smooth pulley. When $m_1 = 10\text{kg}$, $m_2 = 6\text{kg}$, the acceleration of masses is

- (a) 20 m/s^2
 (b) 5 m/s^2
 (c) 2.5 m/s^2
 (d) 10 m/s^2



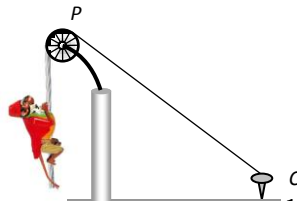
123. A body of weight 2kg is suspended as shown in the figure. The tension T_1 in the horizontal string (in kg wt) is

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



124. One end of a massless rope, which passes over a massless and frictionless pulley P is tied to a hook C while the other end is free. Maximum tension that the rope can bear is 360 N . with what value of minimum safe acceleration (in ms^{-2}) can a monkey of 60kg move down on the rope

- (a) 16
 (b) 6
 (c) 4
 (d) 8

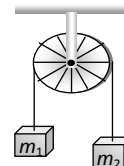


125. A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (vertically). If the acceleration of the system is $g/8$ then the ratio of the masses is

- (a) 8 : 1 (b) 9 : 7
 (c) 4 : 3 (d) 5 : 3

126. Two masses $m_1 = 5\text{kg}$ and $m_2 = 4.8\text{kg}$ tied to a string are hanging over a light frictionless pulley. What is the acceleration of the masses when they are free to move ($g = 9.8\text{ m/s}^2$)

- (a) 0.2 m/s^2 (c) 5 m/s^2
 (b) 9.8 m/s^2 (d) 4.8 m/s^2

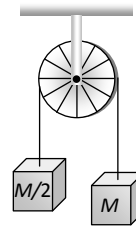


127. A block of mass 4 kg is suspended through two light spring balances A and B . Then A and B will read respectively

- (a) 4 kg and zero kg
 (b) Zero kg and 4 kg
 (c) 4 kg and 4 kg
 (d) 2 kg and 2 kg



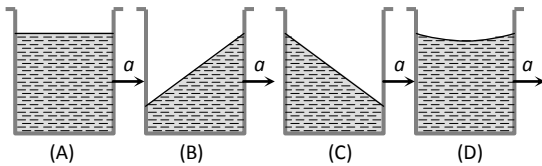
128. Two masses M and $M/2$ are joint together by means of a light inextensible string passes over a frictionless pulley as shown in figure. When bigger mass is released the small one will ascend with an acceleration of



- (a) $g/3$
 (b) $3g/2$
 (c) $g/2$
 (d) g
129. Two masses m_1 and m_2 ($m_1 > m_2$) are connected by massless flexible and inextensible string passed over massless and frictionless pulley. The acceleration of centre of mass is

- (a) $\left(\frac{m_1 - m_2}{m_1 + m_2}\right)^2 g$ (b) $\frac{m_1 - m_2}{m_1 + m_2} g$
 (c) $\frac{m_1 + m_2}{m_1 - m_2} g$ (d) Zero

130. A vessel containing water is given a constant acceleration a towards the right, along a straight horizontal path. Which of the following diagram represents the surface of the liquid



- (a) A (b) B
 (c) C (d) D
131. A closed compartment containing gas is moving with some acceleration in horizontal direction. Neglect effect of gravity. Then the pressure in the compartment is
- (a) Same everywhere (b) Lower in front side
 (c) Lower in rear side (d) Lower in upper side
132. A ship of mass $3 \times 10^7 \text{ kg}$ initially at rest is pulled by a force of $5 \times 10^4 \text{ N}$ through a distance of 3 m . Assume that the resistance due to water is negligible, the speed of the ship is
- (a) 1.5 m/s (b) 60 m/s
 (c) 0.1 m/s (d) 5 m/s
133. The mass of a body measured by a physical balance in a lift at rest is found to be m . If the lift is going up with an acceleration a , its mass will be measured as
- (a) $m\left(1 - \frac{a}{g}\right)$ (b) $m\left(1 + \frac{a}{g}\right)$
 (c) m (d) Zero

134. Three weights W , $2W$ and $3W$ are connected to identical springs suspended from a rigid horizontal rod. The assembly of the rod and the weights fall freely. The positions of the weights from the rod are such that
- $3W$ will be farthest
 - W will be farthest
 - All will be at the same distance
 - $2W$ will be farthest
135. When forces F_1, F_2, F_3 are acting on a particle of mass m such that F_2 and F_3 are mutually perpendicular, then the particle remains stationary. If the force F_1 is now removed then the acceleration of the particle is
- F_1/m
 - F_2F_3/mF_1
 - $(F_2 - F_3)/m$
 - F_2/m

Chemistry

- 136 Which of the following statements in relation to the hydrogen atom is correct?
- 3s-orbital is lower in energy than 3p-orbital
 - 3p-orbital is lower in energy than 3-d-orbital
 - 3s and 3p orbitals all have the same energy.
 - 3s, 3p and 3d orbitals all have the same energy.
- 137 For principle quantum number, $n = 4$, the total number of orbitals having $l = 3$ is
- 3
 - 7
 - 5
 - 9
- 138 The number of d-electrons retained in Fe^{2+} (At. no. of Fe = 26) ion is
- 3
 - 4
 - 5
 - 6
- 139 Pauli exclusion principle helps to calculate the maximum number of electrons that can be accommodated in any
- orbital
 - subshell
 - shell
 - All of these

140. According to modern periodic law, the physical and chemical properties of elements are the periodic functions of their ?
- (a) Density (b) Atomic Number
(c) Mass Number (d) Atomic Mass
141. Highest electropositive element in the periodic table is
- (a) Cs (b) Rb
(c) K (d) Na
142. The correct order of ionic radii of the species N^{3-} , O^{2-} , Na^+ and F^- is
- (a) $Na^+ < F^- < O^{2-} > N^{3-}$ (b) $F^- < O^{2-} < N^{3-} > Na^+$
(c) $O^{2-} < N^{3-} < F^- > Na^+$ (d) $N^{3-} < Na^+ < F^- > O^{2-}$
143. The basic strength of the oxides follows the order
- (a) $Al_2O_3 > MgO > Na_2O$ (b) $Al_2O_3 < MgO < Na_2O$
(c) $Na_2O_3 < MgO > Al_3O_2$ (d) $Al_2O_3 > MgO > Na_2O$
144. The correct order of the size of C, N, P, S follows the order
- (a) $N < C < P < S$ (b) $C < N < S < P$
(c) $C < N < P < S$ (d) $N < C < S < P$
145. Which of the following oxide is most acidic?
- (a) Na_2O (b) Al_3O_2
(c) P_2O_5 (d) SO_3
146. Downward in a group, electropositive character of elements
- (a) increases (b) decreases
(c) remains same (d) none of these
147. Element which has more negative electron gain enthalpy is
- (a) F (b) O
(c) Cl (d) S
148. The electronegivity of the following elements increase in the order
- (a) C, N, Si, P (b) N, Si, C, P
(c) Si, P, C, N (d) P, Si, N, C
149. The ionisation enthalpy of nitrogen is more than that of oxygen molecules because of
- (a) greater attraction of electrons by the nucleus
(b) extra stability of the half filled p-orbitals
(c) smaller size of nitrogen
(d) more penetrating effect

- A If both Assertion & Reason are true and the reason is the correct explanation of the assertion.
 B If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.
 C If Assertion is true statement but Reason is false.
 D If both Assertion and Reason are false statements.
- 150 Assertion : Ionic radius of Na^+ is smaller than Na
 Reason : Effective nuclear charge of Na^+ is higher than Na
- 151 Assertion : First ionisation enthalpy of N is higher than O.
 Reason : Extra stability of fully filled up 2p subshell of N atom
- 152 Assertion : Electron gain enthalpy of Cl is more negative than F atom.
 Reason : F is more electronegative than Cl atom.
- 153 Assertion : First ionisation enthalpy of Galium is higher than aluminium.
 Reason : Weak shielding effect of 3d subshell is Galium.
- 154 Assertion : A solution of table salt in a glass of water is homogeneous
 Reason : A solution having same composition throughout is heterogeneous
- 155 Assertion : The molecular weight of oxygen is 32 amu.
 Reason : The atomic weight of oxygen is 16 amu
- 156 Assertion : No of moles of H_2 in 0.224 L of hydrogen is 0.01 mole.
 Reason : 22.4 L of H_2 at STP contain 6.023×10^{23} moles.
- 157 Assertion : Atomic mass of Na is 23.
 Reason : An atom of sodium is 23 times heavier than 1/12th mass of C-12 isotope.
- 158 Assertion : Number of atoms of He in 60 u of He is 15.
 Reason : Atomic weight of He is 4 u.
- 159 **Assertion** : Number of orbitals in 3rd shell is 9.
Reason : Number of orbitals for a particular value of $n = n^2$.
- 160 **Assertion** : Two nodal planes are present in $3d_{xy}$.
Reason : Number of nodal planes = 1
- 161 **Assertion** : The energy of an electron is largely determined by its principal quantum number.
Reason : The principal quantum number is a measure of the most probable distance of finding the electrons around the nucleus.
- 162 **Assertion** : An orbital cannot have more than two electrons, moreover, if an orbital has two electrons they must have opposite spins.
Reason : No two electrons in an atom can have same set of all the four quantum numbers.

- 163 Packet of energy is called
 (a) Electron (b) Photon
 (c) Position (d) Proton
- 164 Orbital which is not possible
 (a) 2p (b) 3d
 (c) 3s (d) 3f
- 165 the magnetic quantum number of an atom is related to the
 (a) size of the orbital (b) spin angular momentum
 (c) orbital angular momentum (d) orientation of the orbital in space
- 166 The principal quantum number of an atom is related to the
 (a) size of the orbital (b) spin angular momentum
 (c) orbital angular momentum (d) orientation of the orbital in space
- 167 The designation of an orbital with $n = 4$ and $l = 3$
 (a) 4s (b) 4p
 (c) 4d (d) 4f
- 168 What transition in the hydrogen spectrum would have the same wavelength as the Balmer transition $n = 4$ to $n = 2$ in the He^+ spectrum?
 (a) $n = 4$ to $n = 1$ (b) $n = 3$ to $n = 2$
 (c) $n = 3$ to $n = 1$ (d) $n = 2$ to $n = 1$
- 169 The wave number of first line of Balmer series of hydrogen is 15200 cm^{-1} . The wave number of the first Balmer line of Li^{2+} ion is
 (a) 15200 cm^{-1} (b) 60800 cm^{-1}
 (c) 76000 cm^{-1} (d) $136,800 \text{ cm}^{-1}$
- 170 An electron is moving in Bohr's orbit. Its de Broglie wavelength is λ . What is the circumference of the fourth orbit?
 (a) $2/\lambda$ (b) 2λ
 (c) 3λ (d) $3/\lambda$
- 171 A gaseous hydrocarbon gives upon combustion, 0.72 g of water and 3.08 g of CO_2 . The empirical formula of the hydrocarbon is :
 (a) C_6H_5 (b) C_7H_8
 (c) C_2H_4 (d) C_3H_4
- 172 The density of solution prepared by dissolving 120 g of urea (Mol. mass = 60 u) in 1000 g of water is 1.15 g/mL. The molarity of the solution is
 (a) 0.50 M (b) 1.78 M
 (c) 1.02 M (d) 2.05 M

- 173 Which of the following is dependent of temperature ?
- (a) Molarity (b) Molality
(c) Mole fraction (d) Mass percentage
- 174 4 g of NaOH dissolved in 100 ml solution. Molarity of the solution is
- (a) 1 M (b) 10 M
(c) 0.1 M (d) 4 M
- 175 Which has the maximum number of molecules among the following ?
- (a) 44g of CO₂ (b) 44g of O₂
(c) 8g of H₂ (d) 64g of SO₂
- 176 10 mol of Zn react with 10 mol of HCl. Calculate the number of moles of H₂ produced.
- (a) 5 mol (b) 10 mol
(c) 20 mol (d) 2.5 mol
- 177 The number of oxygen atoms in 4.4g of CO₂ is approximately
- (a) 1.2×10^{23} (b) 6×10^{22}
(c) 6×10^{23} (d) 12×10^{23}
- 178 The molarity of a solution obtained by mixing 750 mL of 0.5 M HCl with 250 ml of 2 M HCl will be
- (a) 0.975 M (b) 0.875 M
(c) 1.00 M (d) 1.175 M
- 179 Number of atoms of He in 100 u of He (Atomic mass of He is 4 u)
- (a) 25 (b) 50
(c) 100 (d) 400
- 180 6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of the solution is
- (a) 0.02 M (b) 0.01 M
(c) 0.001 M (d) 0.1 M

