BIOLOGICAL CLASSIFICATION (SOLUTIONS)

Sol.1. Members of kingdom monera show the most extensive metabolic diversity. Members of protista are primarily aquatic. Fungi constitute a unique kingdom of heterotrophic organisms while kingdom plantae includes all eukaryotic autotrophs.

Sol.2. The morphology of the mycelium, mode of spore formation and fruiting bodies form the basis for the division of the kingdom fungi into various classes.

Sol.3 In general, viruses that infect plants have single stranded RNA.

Sol.4. Archaebacteria live in most harsh, habitats such as extreme salty areas, hot springs and marshy areas.

Sol.5. The cell walls of diatoms are embedded with silica. The cell wall of dianoflagellates has stiff cellulose plate at the outer surface. Euglenoids have a protein rich layer called pellicle. Slime moulds possess one spore at their tips with true wall.

Sol.6. Mycoplasma completely lack cell wall.

Sol.7. A kingdom with simple structure and complex behavior is monera.

Sol.8. All unicellular eukaryotic organisms irrespective to their mode of nutrition are included in the kingdom protista. It can be broadly divided into 3 main groups i.e. photosynthetic protist, decomposer protists and protozoans protists.

Sol.9. Slime moulds are saprophytic protists. The body moves along decaying twigs and leaves engulfing organic matter. During unfavourable conditions, they differentiate and form fruiting bodies bearing spores at their tips. The spores possess through cellulose cell walls, and dispersed by air currents.

Sol.10. Some members, of deuteromycetes are decomposers of litter and help in mineral cycling.

Sol.11. Compared to other organisms, bacteria as a group show the most extensive metabolic diversity and they belong to kingdom monera.

So.12. D.J. Ivanowsky recognized certain microbes as causal organism of the mosaic disease of tobacco. M.W. Beijerinek called the infectious fluid as contagium vivum fluidum.

Sol.13. Viroids lacked the protein coat called capsid which is found in viruses.

Sol.14. Bacteria are very simple in structure but complex in behavior. They show most extensive metabolic diversity. Most of them are heterotrophs. They have significant impact on human affair.

Sol.15. Mycoplasma can survive without oxygen. *Gonyaulax* are the members of dinoflagellates. Their cell wall has stiff cellulosic plates on outer surface. The pigments of euglenoids are identical to those present in higher plants. Slime moulds are saprophytic protists. During unfavourable conditions, they form fruiting bodies bearing spores a their tips.

Sol.16. Viruses cause disease in plants and symptoms of diseases can be mosaic formation, leaf rolling and curling, yellowing and vein claring, dwarfing and stunted growth. Rust disease is caused by fungi.

Sol.17. PSTD means potato spindle tuber disease is caused by viroids. They are found as free RNA. They lack protein coat and the RNA of the viroid is of low molecular weight.

Sol.18. Dikaryo phase in fungi is present in members of ascomycetes and basidiomycetes. *Claviceps* and Buffles are members of ascomycetes while *Agaricus* is member of basidiomycetes. Dikaryophase is absent in phycomycetes which member is *Albugo.*

Sol.19. Mesosomes are the infoldings of bacterial cell membranes which are the site of respiration as well as helps in equal distribution of genetic material at the time of binary fission.

Sol.20. Volutin granules are the energy source of bacteria which are polymetaphosphate granules.

Sol.21. Endospores, are highly Thick-walled and resistant spores which are formed in response to adverse environment as sudden increase in temperature.

Sol.22. Cauliflower mosaic virus is used as a marker in genetic engineering and it contains double stranded DNA as genetic material.

Sol.23. Carolus Linnaeus proposed two kingdom classification on the basis of presence and absence of cell wall structure.

Sol.24. Viroids are extremely simple infectious agents consist only nucleic acid without necleoprotein.

Sol.25. All viruses are obligate parasites and can multiply only within living host cells.

Sol.26. Viruses have a very simple structure. They are made of a nucleic acid core and protein coat.

Sol.27. Viruses are obligate parasites. They do not possess their own metabolic system. They have very different body structure as compared to bacteria so can not be killed from antibacterial drugs. They contains only a single type of nucleic acid, either DNA or RNA.

Sol.28. Diener and Raymer found that causal agent of potato spindle tuber disease was a free RNA [no nucleoprotein]. Diener called it viroid.

Sol.29. *Anabaena* is the member of cyanobacteria and these monarans consists specialized cells for nitrogen fixation called heterocysts.

Sol.30. Cyanobacteria are photautotrophs which were the first organisms on earth who developed the process of oxygenic photosynthesis.

Sol.31. Glycocalyx is the outermost coat of bacterial cells which is rich in polysaccharides. A loose sheath is called slime layer while thick and tougher mucilage is called capsule.

Sol.32. Fungi can be defined as nucleated, achlorophyllous organism which possess tubular, filamentous, branched thallus called mycelium. The mycelium can be aseptate and septate. Aseptate mycelium lacks septa and the nuclei occurring in a basically continuous mycelium. This condition is known as coenocytic.

Sol.33. Fungi are eukaryotic organisms. Their cell wall is made of fungal cellulose/chitin Reserve food material is glycogen and oils.

Sol34. In zygomycetes, sexual reproduction is by gametangial copulation which produces a resting diploid spore called zygospore. Because of the presence of zygospore the group of fungi is called zygomycetes.

Sol.35. *Fusarium moniliforme* and *Alternaria solani* both are the members of deuteromycetes and cause wilt disease and early blight of potato respectively.

Albugo condida and *Phytophthora infestanse* are members of phycomycetes and responsible for disease white rust of crucifers and late blight of photato, respectively.

Sol.36. Leaf spot or the tikka disease of groundnut [*Arachis hypogeal*] is caused by *Cercospora* while leaf spot of rice is caused by *Helminthosporium oryzae*.

Sol.37. *Puccinia* is rust fungi. *Ustilago* is smut fungi. White rust of crucifers is caused by *Albugo candida* while causal organism of ergot of rye is *Clavicep purpurea.*

Sol.38. The destruction of the rice crop by a fungus resulted in severe famine of Bengal in 1942-43. The causal organism was *Helminthosporium oryzae* caused leaf spot of rice.

Sol.39. *Colletotricum Falcatum* is the causal organism of red rot disease of sugarcane.

Sol.40. Late blight of potato disease is caused by *Phytophthora infestense* while causal organism of early blight of potato is *Altenaria Solani.*

Sol.41. Fungi live in association with algae as lichens and with roots of high plants as symbiotic relationship which are also seen in the group of bacteria.

Sol.42. Kingdom protista forms a link between prokaryotes and multicellular eukaryotic organism.

Sol.43. In diatoms the cell walls are embedded with silica. They leave behind large amount of cell wall which deposits in their habitat and the accumulation over billion years form diatomaceous earth.

ASSERTION AND REASON (SOLUTION)

Sol.1. Viruses are obligate parasites. They do not possess their own metabolic system. They contains only a single type of nucleic acid, either DNA or RNA.

Sol.2. Viruses are not considered organisms due to lack of cytoplasm and metabolic machinery. They are merely nucleoprotein particles.

Sol.3. Viruses contain only a single type of nucleic acid either DNA or RNA most plant viruses are RNA viruses. This assertion cannot be expressed by the given reason although this is true that all viruses do not possess their own metabolic system so they can multiply only within the living host cells.

Sol.4. Viruses have different genome to their host. They have either DNA or RNA and after infection viral DNA takes over the protein synthesis machinery of host and inactivates the DNA of the host. Viruses lack cytoplasm and cellular organization. Antibiotics generally breakdown the synthesis of cell wall of bacteria which can not kill viruses so that viral diseases can not be treated with antibiotics.

Sol.5. Phycocyanin pigment creates blue colours in blue-green algae. *Nostoc* is the member of cyanobacteria and

possess chlorophyll 'a' [universal photosynthetic pigment] and phycocyanin. Cyanobacteria were the first organisms who started oxygenic photosynthesis on earth.

Sol.6. Both assertion and reason are true but the reason is not the correct explanation of the assertion. All prokaryotic organisms are placed into monera kingdom. Rest four kingdoms protista, fungi, plantae and animalia include eukaryotic organisms, according the five kingdom system of R.H. Whittaker.

Sol.7. Kingdom monera includes all prokaryotic organisms. In prokaryotes, histone protein is absent so DNA is not associated with histone proteins and DNA is naked.

Sol.8. Archaebacteria is the group, contains simplest and most primitive bacteria. They are living under extremely adverse conditions like hot water springs and salt marshes. Their chemical compositions of cell membranes enables these organisms to withstand extreme of temperature and pH.

Sol.9. Bacteria are prokaryotes. All membrane bound cell organelles are absent in prokaryotes so mitochondria which is double membrane bound cell organelle is absent. Mesosomes are respiratory structures which are infoldings of cell membrane. All respiratory enzymes are present on plasma membrane only facing towards cytoplasm.

Sol.10. Archaebacteria can live under extremely adverse environment. The cell membrane of archaebacteria contains branched chain lipids. This chemical composition of the cell membrane enables them to withstand extreme conditions.

Sol.11. Mycoplasma are smallest known organisms which completely lack cell wall. That is the reason of their pleomorphic nature, as they are called "Jokers of the microbiology".

Sol.12. Euglenoids are group of both chlorophyllous and non chlorophyllous flagellate protists. They are regarded as connecting link between plants and animals.

Sol.13. All unicellular eukaryotic organisms, irrespective to their mode of nutrition, are included in the kingdom protista. Prokaryotes lack all membrane bound cell organelles while eukaryotes have all membrane bound cell organelles.

Sol.14. Euglenoids have two flagella, usually one short. Their body is covered by thin and flexible pellicle, instead of cell wall. Due to the presence of photosynthetic pigments such as chlorophyll a and b, β-carotene and xanthophylls, their mode of nutrition is plant like such as holophytic.

Sol.15. *Euglena* has mixotrophic [holophytic + saprobic] mode of nutrition. They are not parasites. Though, they are photosynthetic in the presence of sunlight, when deprived of sunlight they behave like deterotrophs. Due to this nature, they are regarded as connecting link between plants and animals.

Sol.16. The cell wall of diatoms are embedded with silica which do not decay easily. They pile up at the bottom of water reservoirs and form diatomaceous earth. Over the generations there is considerable reduction in size of diatoms during binary fission. The normal size is restored by the formation of rejuvenescent cells called auxospores. Both the statements are true w.r.t. diatoms but the reason is not the correct explanation of assertion.

Sol.17. Fungi are achlorophyllous organisms never autotrophic. *Rhizopus* is the member of zygomycetes and its mycelium is coenocytic i.e. multinucleate and aseptate.

Sol.18. Sexual reproduction in basidiomycetes is caused by plasmogamy or fusion of protoplast without fusion of their nuclei. Karyogamy is delayed for long. The intervening phase is called dikaryophase. In ascomycetes sexual reproduction is through ascospore which are formed endogenously.

Sol.19. Fungi live symbiotically with roots of higher plants as mycorrhiza. Lichens are also symbiotic association between algal component [phycobiont] and fungal component [mycobiont]. Both statements are true but reason is not the correct explanation of assertion.

Sol.20. *Puccinia graminis tritici*, causes black rust of wheat is the member of basidiomycetes deuteromycetes is an artificial class of fungi that has been created to include all those fungi in which sexual stage is not known. Both statements are true and irrelevant.

Sol.21. Deuteromycetes are commonly known as fungi imperfectii because only the asexual or vegetative phases of these fungi are known. When the sexual forms of these fungi were discovered they were moved into classes they rightly belong to. So perfect stage in fungi means sexual stage.

Sol.22. Lichens are very good pollution indicators. They do not grow in polluted areas. Lichens are very sensitivity to air pollution or specially so_2 pollution.

Sol.23. In fungi sexual reproduction decreases in complexity as we move from lower to higher groups. In algae sexual reproduction complexity increases as move from lower (simple) to higher forms. Both statements are true and

irrelevant.

Sol.24. Fungi are widespread in distribution and they even live on or inside other plants and animals. Fungi lack chlorophyll and are unable to synthesize their own food. Their mode of nutrition is heterotrophic [i.e. parasitic / saprophytic] and absorptive. They obtain their food from the external source by the process of extra the external source by the process of extra cellular digestion and absorption. Some fungi live symbiotically too.

TOPIC - 1 (CLASSIFICATION)

Sol.1. All unicellular eukaryotic organisms, irrespective of their mode of nutrition are included in the kingdom protsta. This kingdom divided into three main groups: photosynthetic protists included *Chlamydomonas* and *Chlorella*, consumer or decomposers protsts and protozoans protists.

Sol.2. The yeasts are known for their ability to ferment sugar with the production of carbon dioxide and alcohol. Yeast is a fungus, member of ascomycetes. *Nostoc* and *Anabaena* are examples of cyanobacteria *Paramecium* and *Plasmodium* belong to the kingdom protista, group protozoa. *Penicillium* is fungus, member of ascomycetes. Symbiotic association of an algae and fungi form Lichens.

Sol.3. Five kingdom classification is proposed by R.H. Whittaker in 1969.

Sol.4. Algae are multicellular eukaryotic photosynthetic organisms and belong to the kingdom plantae. Phycomycetes is one of the class of kingdom fungi. Euglenoids belong to the kingdom protista. Archaebacteria are ancient bacteria which belong to the prokaryotic kingdom monera.

Sol.5. Five kingdom classification is proposed by R.H. Whittaker.

Sol.6. According to the five kingdom classification proposed by R.H. Whittaker, only kingdom monera includes prokaryotic organisms. Rest four kingdoms contain eukaryotes.

Sol.7. In Whittaker system of classification, prokaryotes are placed in the kingdom monera.

Sol.8. The Oldest system of classification was two kingdom system, which included tow kingdoms : Plantae and Animalia. These two kingdoms were constantly figured in all biological classification.

TOPIC - 2 (KINGDOM - MONERA)

1. Compared to many other organisms, bacteria as a group show the most extensive metabolic diversity kingdom monera includes photosynthetic, chemosynthetic, heterotrophic, saprophytic, symbiotic, parasitic and few which live in extreme harsh conditions organisms.

2. *Volvox*, *Penicillium* and *Agaricus* are eukaryotic organisms. *Nostoc* is prokaryotic which lack of all membrane bound cell organelles.

3. The photosynthetic pigment present in the members of cyanobacteria are chlorophyll and phycobilins i.e., phycocyanin (blue coloured), allophycocyanin (light blue coloured) and phycoerythrin (red coloured). These pigments give cyanobacteria blue green colour.

4. Bacteria are prokaryotes. They do not possess any membrane bound structure. Nuclear membranes are absent so well defined nucleus is not present there.

5. In gram +ve bacteria, cell wall possess a thick peptidoglycan layer and also contains teichoic acids which perform several functions such as binding metals, acting as receptor site for some viruses, and maintaining cells at low pH to prevent degradation of cell wall by self produced enzymes.

6. Methanogens, members of archaebacteria, live in rumen of herbivours like buffalo, cow (ruminents) etc. A peculiar odour than prevails in marshy areas and cowsheds is on account of a methane gas produced by methanogens.

7. Spirochaetes are the members of monera and examples of bacteria.

8. *Escherichia coli* is gram □ve bacteria

9. In gram +ve bacteria the cell wall has very little lipid content. Therefore, very little stain leaks out of their walls in organic solvent. In gram □ve bacteria the cell wall has high lipid content. The same dissolves in organic solvent taking out the stain alongwith. So the main difference between gram +ve and gram □ve bacteria is in their cell wall structure.

10. According to the five kingdom system proposed by R.H. Whittaker, bacteria belong to kingdom monera.

11. Some acedothermophils and hyperthermic organisms are those bacteria which live in the highly acidic (pH-2) habitats belong to the groups eubacteria and archaebacteria.

12. Streptococcus are bacteria and members of prokaryotic kingdom monera. They lack of all membrane bound

cell organelles.

13. *Beijerinckia* and *Azotobacter* both are aerobic free-living nitrogen fixer. *Rhizobium* lives symbiotically wheather *Rhodospirillum* & *Clostridium* are anaerobic free living nitrogen fixer.

14. *Azospirillum lipoferum* is a gram negative motile bacteria belonging to the order Rhodospirillales, associated with roots of monocots, including important crops, such as wheat, corn and rice. *Rhizobium leguminosorum* is the common symbiotic bacteria associated with root nodules of lenguminous plants like pea or beans.

15. Nitrogen fixation in cyanobacteria under anaerobic conditions mainly occurs in specialized cells called heterocysts.

16. Phage genome when integrates with bacterial genome in the process of site specific recombination, resultend structure is called prophage.

17. *Azotobacter* is aerobic free-living nitrogen fixer.

18. Brown rot of potato is caused by the bacterium *Ralstonia solanacearum* while potato leaf roll virus, member of the genus polerovirus. Sugar cane mosaic virus is a plant pathogenic virus of the family potyviridae. Rust of wheat is a fungal disease caused by *Puccinia graminis tritici.*

19. Bacteria that make their own food, and fix CO_2 by using chemicals as energy source are called chemoautotrophs.

20. *Frankia* is a genus of nitrogen fixing filamentous bacteria that live in symbiotically with actinorhizal plants.

21. Denitrifying bacteria performs the opposite function of nitrifying bacteria and converts nitrates into nitrites and then to free nitrogen.

22. Pasteurization temperature is 65°C for 30 minutes.

23. Plasmids are small, self-replicating, extrachromosomal single circular DNA, present in the cytoplasm of bacteria.

24. Cosmids are a type of hybrid plasmids that contains a lambda phase cos sequence. (cos sites + plasmid = cosmid), so they are fragment of DNA inserted in bacteria for forming copies (replication).

25. Monera is the kingdom of prokaryotic organisms.

26. Highest number of antibiotics are produced by streptomyces, which is the largest genus of Actinobacteria and family streptomycetaceae.

27. *Xanthomonas oryzae* is the causal organism of the bacterial blight of rice disease.

28. *Pseudomonas* is the denitrifying : bacteria which reduce nitrates to nitrogen in soil.

29. *Azotobacter* is aerobic free living nitrogen bacteria present in soil.

30. *Rhizobium leguminosarum* is the symbiotic bacteria associated with the roots of lengumes and fix the atmospheric nitrogen into nitrates and nitrites.

31. Pasteurization is the process in which heating of milk at 65°C followed by sudden cooling.

32. Many temperate phages can integrate their genomes into their host bacterium and enter into lysogenic pathway where bacterial cell undergoes many divisions and prophage is formed.

34. Endospores are highly highly thick-walled and resistant spores which are formed in response to adverse environment, presence of harmful waste products etc.

35. *Anabaena* is free living nitrogen fixing cyanobacteria which form symbiotic association with the water fern *Azolla*.

36. Plasmids are small, self-replicating, extra nuclear single circular DNA, present in the cytoplasm of bacteria.

37. Transformation phenomenon is given by Griffith.

38. Kingdom monera constitutes all prokaryotic organisms.

39. Archae have some noble features as they have histone protein which is not just alike the eukaryotes. They can survive in harsh environments and extreme conditions where other prokaryotes or eukaryotes can not live.

40. Thermococous, methanococcus and methanobacterium are the examples of archae bacteria that contain his tone protein which is not just alike to eukaryotes but homologous to eukaryotic core histones.

41. There will be 5 rounds of binary fissions initially 1×10^5 will be double i.e., 2×10^5 in one round which is followed by 4×10^5, 8×10^5, 16×10^5 and consequenthy 32×10^5 bacterial cells will present in culture.

42. Cell wall of fungi are homopolymer of N-acetyl glucosamine and bacteria has hetero polymers cell wall of N-acetyl glucosamine and N-acetyl muramic acid.

43. Slime - moulds are eukaryotic organisms and members of protista.

44. Cell wall of gram positive bacteria are made up of peptidoglycans which is 70 □ 80%, constitude of N - acetyl muramic acid and N - acetyl glucosamines.

45. Cell wall of bacteria (gram positive bacteria) contains teichoic acid in the uppermost layer. Flagella is made up of flagellin protein. 'S' layer of the basal body of flagella ∈ has glycoprotein substance while pili and fimbrae contains pilin and fimbrin proteins.

46. The vast majority of bacteria are heterotrophs i.e., they do not synthesize their own food but depends on other organisms or on dead organic matter for food, same as fungi.

47. *Azotobacter* is free - living, acrobic, non - photosynthetic, and nitrogen fixing bacteria.

48. Bacteria has one, double stranded DNA which is not wrapped with histone protein but with poly amines molecules. This is called primitive chromosomes or Genophore.

49. Nitrifying bacteria convert ammonium salts first into nitrites (*Nitrosomonas, Nitrosococcus*) that are subsequently converted into nitrates (*Nitrobacter*).

50. Bacteria are prokaryotic organisms. They lack of chloroplast so no cyclic or non - cyclic phosphorylation occur there. They do not use H_2O and do not produce O_2 during photosynthesis. They absorb light > 900 nm of wavelength.

51. Lysozyme enzymes present in tears, saliva and other body secretions, hydrolyse peptidoglycan substance present is Gram +ve bacteria in more quantity.

52. Growth curve of bacteria has stages as lag, log, stationary and decline.

53. E.Coli is Gram negative bacteria, which lacks all membrane bound cell organelles because of the reason of prokaryotic origin.

54. Mycorrhiza is the symbiotic association of fungi and higher plants roots which is responsible for absorption of phosphate by solubilization. *Bacillus thuringiensis* has cry genes which codes toxins.

55. *Xanthomonas citri* is the causal organism of citrus canker disease.

56. Cell wall of bacteria is made of peptidoglycans which is heteropolymer of N - acetyle glucosamine and N - acetyle muramic acid sugar along with polypeptide chain.

57. Bacteria have small, self replicating, extra chromosomal DNA called plasmids.

58. *Dialister pneumosintes* is smallest bacterium, size 0.15 □ 0.3 µm long and 100 □ 200 µm diameter.

59. Inner folding of plasma membrane in bacteria form mesosome which is site of respiration in bacteria.

60. Transformation experiment was first performed on *Diplococcus pneumonia* bacteria which has tow strains named R - strain and S - strain.

61. Plasmid is self - replicating extra nuclear DNA, present in bacterial cytoplasm.

62. Curling of tea leaves is brought about by the activity of bacteria.

63. *Clostridium botulinum* that cause botulism is an obligate anaerobe.

64. Bacterial flagella are made of flagellin proteins and do not have (9 + 2) arrangement and ATP ase activity.

65. The outer face of outer membrane of gram negative bacteria contains lipopolysaccharides, a part of which is integrated into the membrane lipids. So in gram negative bacteria, the cell wall has high lipid content, which dissolves in organic solvent taking out the stain alongwith.

66. Gene regulation in bacteria is shown by Jacob and Monod.

67. *Pseudomonas* is denitrifying bacteria which convert nitrates into nitrites and then into free nitrogen.

68. Bacteria with single flagella at one end is called monotrichous.

69. *Lactobacillus casei* and *Streptococcus thermophilic* bacteria are responsible for the formation and flavor of yoghurt.

70. Bacteria do not use H_2O as an energy source or raw material in the process of photosynthesis so they do not liberate oxygen.

71. Plasmid is extra chromosomal DNA in bacterial cell.

72. Pasteurization is the process in which heating of liquid between 65°C to 80°C is done, followed by rapid cooling to kill the bacteria growth.

73. The cell wall of bacteria consist of N - acetyl glucosamine and N - acetyl muramic acid along with

polypeptide chain.

74. In folidngs of cell membrane is called mesosome which is site of respiration in bacteria.

75. Crown gall disease in plant is caused by *Agrobacterium tamiaifacience* which has tumor inducing plasmid called Ti - plasmid.

76. Bacteria have rigid cell wall, made of peptidoglycans and considered as plants.

77. All monerans are prokaryotes, which have DNA, RNA, demonstrate a long circular strand of DNA not found enclosed in a nuclear membrane and bacteria are examples of them.

78. The minimum salt concentration required for growth of halophyls is 2 □ 2.5 m while optimum is 4 □ 5 m.

79. Cyanophycian □ phycocyanin is the pigment present in cyanobacteria.

80. Bacteria are prokaryotes and do not have membrane bound cell organelles such as mitochondria, chloroplasts etc.

81. *Escherichia coli* are related to human insulin production. *Rhizobium meliloti* has nitrogen fixation gene called 'Nif' gene. *Bacillus thuringiensis* is responsible for production of Biodegradable insecticide, while *Pseudomonas putida* produces digestive hydrocarbons of crude oil.

82. Phosphorus cycle contains only sedimentary phase. Gaseous phase is not found there.

83. A loose sheath of outermost cost of bacterial cells is called slime layer. It protects the cell against the desiccation and viral and enzyme attack from surroundings.

84. The asexual spores (conidia and sporangiospores) formed by colletotrichum taleatum, sphaerotheca and Rhizopus stolonifer are single celled.

85. Plasmids which are extra chromosomal hereditary material of bacteria sometimes get associated with nucleiod and this is called episomes.

86. Infoldings of cell membrane of bacteria form mesosome and this structure is responsible for respiration.

87. Bacteria is prokaryotic cell so it contains only nucleic acid i.e., naked DNA which lacks histone protein around them.

88. Common symbiotic bacteria are *Rhizobium leguminosorum* associated with root nodules of leguminous plants.

89. Denitrifying bacteria functions opposite to the nitrifying or nitrogen fixer bacteria and convert nitrates into nitrites and subsequently to nitrogen.

90. *Frankia* is symbiotic nitrogen fixer actinomycetous filamentous soil bacteria.

91. 'L' layer of basal body of bacterial flagella is made up of glycoproteins.

92. *Pseudomonas* bacteria is useful because of its ability to decompose variety of organic compound and free the atmospheric nitrogen.

93. Mycoplasma are not cell wall bound and definite shape organisms. Virus does not have cellular organizations. Cyanobacteria are not colour less. Only Bacteria are colourless, unicellular, cell wall bound, spherical or rod shaped which lack organized nucleus.

94. Nitrogen fixation gene "Nif gene" occurs in Rhizobium

95. $\text{Amonium salts} \xrightarrow[\text{Nitrosococcus}]{\text{Nitrosomonas}} \text{Nitrites} \xrightarrow{\text{Nitrobacter}} \text{Nitrites}$

96. A form of plasmid called F - plasmid contain fertility factor i.e., F - factor in bacteria.

97. *Streptomyces* is the source of antibiotics, *Rhizobium* is symbiotic nitrogen fixer bacteria, *Nitrosomonas* performs nitrification and *Acetobacter* is responsible for vinegar synthesis.

98 *Pseudomonas putida* is plant growth promoting rhizobacterium, which overproduce indoleacetic acid.

99. Single spherical bacterium devoids of flagella. Anthrax causing bacteria is rod shaped. Pneumonia causing bacteria *Diplococcus pneumonia* are present in pairs. Cholera causing bacteria *Vibrio cholera* is comma shaped.

100. Binary fission is the universal method of multiplication in bacteria.

101. Chromasome in bacteria is primitive chromosome which lacks histone proteins and have naked DNA which is always circular.

102. Bacteria produces maximum number of antibiotics, vaccines, serums and vitamins.

103. Toxin substances are secreted by bacterial plasmids.

104. Blue green algae and *Rhizobium* both are nitrogen fixing organisms.

105. Cyanobacteria is an algae having blue - green pigaments.
106. The decolorized gram negative bacteria may be stained with safranine or eosine (red in colour).
107. Some rod shaped bacteria like *Bacillus* and *Clostridium* form spore inside the vegetative cell called endospores.
108. Circular, naked, free DNA is found in bacteria.
109. Bacteria do not possess chlorophyll a as photosynthetic pigment.
110. The outer membrane of gram □ve bacteria contains proteins called porin and these proteins function as channels for the entry and exit of hydrophilic low molecular weight substances.
111. *Clostridium* is anaerobic nitrogen fixing bacteria. It can utilize N_2 but cant the O_2.
112. Bacteria work as decomposers and also responsible for recycling of materials.
113. Peritrichous form of bacteria have flagella all over their body.
114. N - acetyl muramic acid and N - acetyl glucosamine are sugars which constitude peptidioglycans along with polypeptide chains which is the major component of cell wall of gram positive bacteria.
115. *Mycobacterium leprae* causes leprosy.

TOPIC □ 3 (KINGDOM - PROTISTA)

1. *Albugo condidus* is a fungus and not the member of protistan group chrysophyta.
2. Chrysophtes have the characteristic, feature of indestructible wall layer deposited with silica.
3. Single celled eukaryotes are included in protista, irrespective to their mode of nutrition.
4. Protistans are not prokaryotic in cell structure. They include unicellular eukaryotic organisms.
5. Mycoplasma completely lack cell wall, are smallest living cell known and can survive without oxygen.
6. Slime moulds have amoeboid structures at one stage of the life cycle when their haplospores germinate. Spores go for fusion and produce zygote which brings diplophase. The diploid zygote forms the plasmodium that becomes multinucleate by repeated mitotic division and produce spores like fungi.
7. Kingdom protista includes all unicellular eukaryotic organisms, irrespective to their mode of nutrition.
8. Plasmodium is aseptate mass of protoplasm of slime molds which is saprophytic in nature and spore producing. Dispersal of spores is done by air current.
9. Mycoplasma are smallest free - living organisms.
10. Protista includes unicellular eukaryotes.
11. Desmids and diatoms are member of the class bacillariophyceae and phylum chrysophyta. Dinoflagellates e.g. *Gymnodium* and *Gonyaulax* are members of dinophyceae and phylum pyrrophyta. *Euglena* is the member of euglenoid while *Paramecium* is protozoa.
12. Acellular slime moulds have sporangium usually contains a net work of fine threads called capillitium.
13. *Physarum* is the example of slime mould.
14. Formation of auxospores is the characteristic feature of many diatoms while few cyanobacteria are homocystous.
15. *Euglena* has myxotrophic mode of nutrition. In the presence of sunlight if produces its own food, while in the absence of sunlight it takes food saprobically. It is regarded as connecting link between plants and animals.
16. *Trypanosoma, Noctiluca, Monocystis* and *Gittrdial* are unicellular protists.
17. Thalloid body of slime moulds which resembles the mass of protoplasm is called plasmodium.
18. If the main organism body is diploid, it under goes gametengial meiosis to form haploid gametes which fuse and form diploid zygote to resume diplophase.
19. Diatoms and desmids are member of class bacillariophyeae and kingdom protista.
20. *Plasmodium* is an endoparasite.
22. Kingdom protista includes unicellular eukaryotic organism irrespective to their mode of nutrition where autotrophs and heterotrophs both are included.
24. Cell wall of diatoms is embedded with silica and not made up of murine.

TOPIC – 5 FUNGI

1. The yeast are well known for their ability to ferment sugars with the production of carbondixoide and alcohol. They are used in the production of bread and beer.

2. *Glomus* is a genus of arbuscular mycorrhizal fungi, which form symbiotic relationships [mycorrhiza] with plant roots, and helpful in providing nutrition.

3. *Glomus* helps in absorption of phosphorus from soil by plants.

4. *Puccinia* is rust fungi.

5. The association mycorrhiza is relationship of fungi and higher plants.

6. Real root of sugarcan is caused by *Collectrotrichum falcatum.*

7. Edible part of mushrrom is basidiiocarp.

8. VAM = Vasicular arbuscular Mycorrhizas are symbiotic association of fungi.

9. Saccharomyces [yeast] is unicellular and member of ascomycetes [sac fungi].

10. Ascomycetes is the class of fungi and comes under kingdom fungi, not under kingdom protista.

11. Morels are members of the class. Ascomycetes Rust and Smut fungi comes under basidiomycetes. Bread moulds comes in the class phycomycetes while imperfect fungi are members of deuteromycetes.

12. Ringworm is a skin infection caused by a fungus.

13. *Rhizopus* is the member of zygomycetes. *Penicillium* belongs to eurotiomycetes which is a class of ascomycetes and comes under phylum ascomycota.

Ustilago is the member of class ustilaginomycetes while dothideomycetes is the largest and most diverse class of ascomycetes fungi which example is *Alternaria.*

14. *Aspergillus niger* produces citric acid.

Clostridium butvlicum produces butyric acid.

Saccharomyces cerevisial produces ethanol.

Trichoderma polysporum involves in the production of cyclosporium-A while *Monascus purpureus* statins.

15. Asexual reproduction in fungi occurs by condia.

16. *Ustilago* has haplonitc life cycle.

17. Early blight of potato is caused by *Alternaria Solani.*

18. Cell wall of fungi is made up of cellulose [phycomycetes] and chitin [ascomycetes, basidiomycetes and deuteromycetes].

19. Clamp connections create genetic variations within the hyphae and are unique feature of the phylum basidomycota.

20. *Saccharomyces cerevisiae* is also called baker's yeast.

21. Chitin is present in the cell wall of fungi.

22. Alexander Fleming discovered antibiotics penicillin of *Penicillium notatum.*

23. Reserve food material of fungi is glycogen [animal starch] and oils.

24. Cell wall of fungi are made of homopolymer of N-acetyl glucosamine. This is also present in cell wall of bacteria alongwith N-acetyl muramic acid and polypeptide chain.

25. Stages of sexual reproduction in *Rhizopus* are – secretion of trisporic acid, formation of warty wall layer of zygospore, formation of zygophores, formation of germ tube.

26. Lichens are composite organisms consisting of a fungus [the mycobiont] and a photosynthetic partner [algae, phycobiont]. They both are thalloid forms in symbiotic association and constant physical contact which involve almost equal physiological interdependence.

27. *Fusarium graminearum* is commonly found on cereal grains, most commonly on wheat and barley. *Fusarium* and *Rhizopus* are grown in fermentation as protein food.

28. Slimy mass of protoplasm with many nuclei and an Amoeba-like thalloid body is characteristic feature of slime moulds [myxomycetes].

29. Athlete's foot is a fungal disease Kala-azar is caused by *Leishmania*. Chicken pox is a viral disease while Typhus fever is caused by bacteria *Rickettsia*.

30. Streptomycin is produced by strains of *Streptomyces griseus.*

31. Respiratory process of yeast is anaerobic.

32. Morchellae is edible fungus.

33. Saccharomyces [yeast] is unicellular fungus which doesn't form hyphae or mycelium.

34. Late blight of potato is caused by *Phytophthora infestense.*

35. Pythium is a genus of parasitic oomycete and contains cellulose in the cell wall.

36. Root knot disease of brinjal is caused by a nematode *Meloidogyne incognita.*

37. Hormones are not commercially produced by yeast.

38. Sporangiospores borne in the sporangium of *Rhizopus* are haploid spores.

39. *Caldonia rangiferina* is a fruticose lichen also called reindeer lichen.

40. Lichen is the symbiotic association of algae and fungi.

41. Bakane disease is caused by a fungus – *Fusarrum monififorme*.

42. Fungi are classified on the basis of sexual reproduction whereas sexual reproduction is present in oomycota and eumycota while it is not yet observed in fungi imperfectii.

43. Fungi differs from slime moulds by lacking of flagellated spores.

44. Early leaf spot disease in *Arachis hypogea* is caused due to *Cercospora personata.*

45. Wilt of pigeon pea is caused by *Fusarium*. Root knot of brinjal is caused by *Meloidogyne.* Red stripe of sugarcane is caused by *Pseudomonas.* Ear cockle of wheat is caused by *Anguinia.*

47. Sphacelotheca genus is smut fungus, a member of family ustilaginaceae and class basidiomycetes and produces chlamydospores from dikaryotic mycelium.

49. Secondary mycelium of mushroom produces umbrella like structure called as Pileus.

50. Lichens are the pioneer vegetation on lithosere succession.

51. Phosphate is provided to plants by fungi in the mycorrhizal association.

52. Mycoplasma do not have cell wall and antibiotic penicillin inhibits cross linking of peptidogycan strands of cell wall.

53. *Cyathus novaezelandial* is an example of birds nest fungi. It alongwith puff balls belong to basidiomycetes.

54. Ergot of rye is caused by *Claviceps spp*.

55. *Puccinia graminis triticii* is the causal organism of black or stem rust of wheat.

56. The yeast [*Saccharomyces spp.*] are well known for their ability to ferment sugar with production of carbondioxide and ethanol. The beer, wine and alcohol yeast are included in the germs *Saccharomyces.*

57. Both are true statements. Increases in complexity of sexual apparatus from simple to higher forms in algae is not responsible for decrease in sexual apparatus in fungi from lower to higher forms.

58. In the symbiotic association of algae and fungi in mycorrhiza, fungi absorbs minerals and water from soil and provide it to algae [phycobiont].

59. Lichens are the indicator of pollution.

60. Phytoalexin is antimicrobial and often antioxidative substance which is used by plants to provide protection from fungal disease.

61. Fungus is eukaryotic multicellular organism and may cause disease to plants and animals.

62. A witch's broom or witches broom is a disease or deformity in woody plant and caused by fungus – *Taphrina betulina*

63. Foolish seedling disease of rice in Japan was caused by a fungus – *Gibberella, Fujikuroi.*

64. Covered smut of barley is caused by *Ustilago hordei.*

65. Oligotrophic soil is soil with poor nutrients. Mycorrhiza and lichens with their extremely low metabolic rate are present there.

66. In zygomycetes, sexual reproduction produces a resting diploid spore called zygospore which does not give rise to new mycelium directly.

67. Class deuteromycetes is called fungi imperfectii due to absence of sexual reproduction.

68. Sometimes zygospores are produced parthenogenetically. They are multinucleate and called azygospores.

69. Term 'helotism' is used for the symbiotic relationship of algae and fungi where algae plays a role of slave and fungi as master.

70. Red rot of sugarcane and rice blast disease are caused by fungi *Colletrotrichum falcatum* and *Pyricularia grisea* respectively. Grain smut of sorghum is caused by *Aspergillus spp.* The both *Pyricularia* and *Aspergillus* are related to the same division Ascomycota.

71. Lichens, mosses, herbs and shrubs is the correct sequence of origin in the place rocky and barren to make them green forest.

73. Mycorrhiza is the symbiotic association of algae and fungi.

74. *Rhizopus stolonifer* is the causal organism of soft-rot disease of sweet potato.

75. Temperature of about 25°C, relative humidity of about 95% and a shady place are required for optimum growth of *Mucor*.

76. True slime moulds have spores that develop into flagellated swarm cells.

77. VAM = Vasicular arbuscular mycorrhiza are symbiotic association of fungi.

78. Rust, smut and mushrooms all are members of basidomycetes and possess basidiocarp.

79. Myxomycetes are slimy mass of multinucleate protoplasm, having pseudopodia like structures for engulfing food, reproduction through fragmentation or zoospores.

80. Heterothalism was discovered by Blackslee.

81. As a fungus completed its life cycle on two hosts, it is cycle on two hosts, it is termed as heteroecious. Eg., *Puccinia* [rust fungi] completes its life cycle on wheat and Barley.

82. Parasexuality in fungi can be called genetic recombination without meiosis. A parasexual cycle is initiated by the fusion of hyphae during which nuclei and other cytoplsamic components occupy the same cell [plasmogamy]. Fusion of the unlike nuclei in the cell of the heterokaryon results in karyogamy, which is believed to be unstable and can produce segregants by recombination involving mitotic crossing-over and haplodization.

83. *Albugo* is the member of phycomycetes which possess branched, aseptate, coenocytic mycelium.

84. *Agaricus* is a genus of mushrooms, characterized by having a fleshy cap or pileus, from the underside of which grow a number of radiating plates or gills on which are produced the naked spores, called basidiospores.

85. Phycomycetes is a class in kingdom fungi.

86. Type of nutrition and composition of cell wall are the other differences between fungi and higher plants except absence of chlorophyll.

87. Ergot fungi *Calviceps* is the member of ascomycetes.

88. Anitbiotics penicillin has been discovered from the fungal colony *Penicillium notatum.*

89. Red rot of sugarcane is caused by *Colletotrichum falcatum* whereas *Albugo candida* is the causal agent of white rust of crucifers.

90. Basidomycetes are called club fungi because of a club shaped end of mycelium known as basidum.

91. The fusion will be held between 24 nuclei of both the thallus. They become diploid and then undergo meiosis. One diploid nucleus will produce 4 spores. So $24 \times 4 = 96$ spores will be there.

92. Lactic acid production from xylose is done by the fungus *Rhizopus oryzae.*

93. *Albugo candida* is the causal organism of disease white rust of cruciferae.

94. Parasexuality involve fusion of proto-plast.

95. Fruiting body of *Penicillium* is closed type, called cleistothecium.

96. Non-motile, thick walled, asexual fungal spores produced exogenously at the tip of the hyphae are called conidia.

97. Fungi lack of photosynthetic pigments.

98. Lichens show mutualism between algae and fungi.

99. Parasitic and saprophytic conditions are more familiar in fungi as they lack of chlorophyll pigments.

100. Lomasomes appear to be accumulation of material between the plasmalemma and cell wall of fungal hyphae.

101. *Agaricus* is edible fungi.

102. Microbial gallic acid production by *Aspergillus niger* are found in galls, which is used in ink making.

103. Ergotism is also known as ergotoxicosis, ergot poisoning and saint Anthony's fire disease and caused by fungus *Cleviceps*.

104. Mushroom belongs to basidiomycetes.

105. Yeast belong to ascomycetes.

106. *Magnaporthe grisea* is sexual stage of pathogen of blast of rice and *Colletotrichum falcatum* is the causal organism of red rot of sugarcane.

107. Basidiocarp is the fruting body of fungi which is edible.

108. Zygophore, progametangium, gametangium and zygospore is the successive structure of sexual reproduction of *Rhizopus.*

109. Yeast hyphae grow in a way that they give appearance of pseudomycelium so yeast is not included in protozoans but in fungi.

110. According to the classification of Ainsworth, *Rhizopus* comes under zygomycotina

111. Two haploid yeast of opposite mating type secrete pheromones, grow projections and mate.
112. Filament of Rhizopus is multinucleate aseptate and called coenocytic.
113. Sir Alexander Fleming discovered the antibiotic penicillin from the fungus *Penicillium notatum.*
114. In the symbiotic association between algae and fungi, the fungus provides protection, anchorage and absorption for the alga.
115. Fungi/Lichens which grow on wood are called corticolous.
116. Mycorrhiza promotes growth of plant by absorping inorganic ions from soil.
117. The conidia, conidiophores mycelium and setae are septate in *Colletotrichum falcatum.*
118. Chloromycetin or chloramphenical is obtained from *Streptomyces venezualae*.
119. Aspergillus causes disease in human beings.
120. In mushrooms gills bears spores which help in reproduction.
121. Black or stem rust of wheat is caused by a fungus *Puccinia graminis triticii.*
122. VAM is useful for phosphate nutrition.
123. The hypha of *Rhizopus* is aseptate, branched and multinucleate, called coenocytes.
124. Litmus is a soluble powder and obtained from lichens.
125. Association of algae and fungi in lichens is called mutualism.
126. Fungi is decomposer in a forest ecosystem.
127. Fungi causing hair loss are Keratophilous.
128. Black or stem rust of wheat is caused by *Puccinia graminis triticii.*
129. Chitin is the homopolymer of N-acetyl glucosamine.
130. Fungi are mutlicellular eukaryotes which lack chloroplast.
131. Phytotoxins are generally phenolic compounds, secreted by fungi.
132. Parasexuality was first discovered by Blackslee in fungi.
133. *Agaricus* is the member of basidiomycetes and form basidiospores.
134. The genus *Amanita* contains about 600 species of agaricus including some of the most toxic muschrooms.
135. Muscarine is poison, produced by *Amanita virosa*.
136. Powdery mildews of wheat is caused by *Erysiphe graminis tritici* and it is member of asomycetes.

TOPIC - 6: VIRUS / VIROIDS

1. The shape of different types of viruses varies considerably. They may be spherical or rod shape, tadpole like, helical or polyhedral.
2. Mycophage, Reovirus, wound tumor virus and Rice dwarf viruses have double stranded RNA.
3. A virus differs from a bacterium as it contains DNA or RNA as genetic material with no ribosomes.
4. All viruses are obligate parasites and can multiply only within the living host cells.
5. A prion is the scrapie form [PrPSc] is an infectious agent composed of protein in a misfoleded form.
6. Virus envelop is known as capsid, made of lipids or lipoproteins.
7. Bacteriophages are viruses which feed on bacteria and kill them.
8. Cyanophage = ssDNA, Herpes Virus = dsDNA, Polio Virus = ssRNA while Leuko virus contains both DNA and RNA.
9. Diener and Raymer found that causal agent of PSTD was a free RNA. Diener called it viroid.
10. National Institute of Virology is situated in Pune.
11. In lytic pattern of viral replication, virus enters a cell, replicates, and then causes the cell to brust releasing new viruses.
12. The protein coat is called capsid. It is present generally when the virus is outside host cells. It is made up of many identical proteins sub unit called capsomeres.
13. All viruses are intracellular obligate parasites.
14. Casual agent of potato spindle tuber disease [PSTD] is a free RNA, called viroid.
15. Tobacco mosaic virus has single standed RNA molecule.
16. HIV contains single stranded RNA. It is classified as retrovirus because its genetic information is carried in RNA instead of DNA.
17. CJD = Creutzfeldt Jakob Disease is caused by Prions which are protenatious infectious agent.

18. All viruses are obligate parasites.

19. Viruses contain only a single type of nucleic acid, either DNA or RNA.

20. The shape of different viruses varies considerably. T-shaped bacteriophages are tadpole like and can be recognized easily.

21. The genetic material of AIDS virus is single stranded RNA.

22. Adolf Meyer discovered the viral disease tobacco mosaic. D.J. Ivanowski (1892) discovered the viruses in an extract of tobacco plant.

23. The rabies virus is a neurotropic virus that causes fatal disease in human and animals and contains ssRNA.

25. Ability to multiply into host cell, to cause disease and to undergo mutation are living characteristics features while ability to be crystallize is the non-living characteristics of virus.

26. Virus is obligate parasite and mulitiplies only in living tissue.

27. AIDS Virus HIV, affects helper T-cells.

28. Polio Virus contains ssRNA while dsRNA is present in Rice dwarf virus. M13 bacteriophage contains ssDNA while dsDNA is found in Cauliflower Mosaic Virus.

29. Retroviruses have only RNA as genetic material.

30. Enveloped virus enters into host cells by injecting own nucleic acid inside host cells.

31. Provirus is a virus genome that is integrated into the DNA of a host cell.

32. Virus consists of nucleic acid and protein both.

33. Tobacco Mosaic Virus contains ssRNA.

34. Bacteriophage has a core tube filled with lysozyme type of enzymes that probably help in the penetration of tail in the susceptible cell.

35. Laprosy and AIDS virus contain single stranded RNA while Hepatitis-B is 42 nm is size and contains double stranded DNA.

36. Potato leaf roll and leaf curl of papaya are viral diseases of plants.

37. Transduction is the phenomenon which is a kind of sort of sexual reproduction in bacteria and cannot take place in the absence of bacteriphage.

38. Core tube of tail in bacteriophage is surrounded by a helical contractile shealth which is attached to the neck by a collar.

39. Virus are non-cellular, non-cytoplasmic infectious agents which contain only a single type of nucleic acid either DNA or RNA. They maintain genetic continuity and undergo mutation and can multiply only within the living host cells.

40. Viruses that infect bacteria, multiply and cuase their lysis are lytic viruses.

41. Retrovirus contains RNA as genetic material. The retrovirus genome needs to be reverse-transcribed into DNA by an enzyme called reverse-transcriptase which transform ssRNA into DsDNA.

42. Some virus has RNA as genetic material while others have DNA, but never both.

43. Transduction is the phenomenon of sort of sexual reproduction in bacteria in which transfer of some genes from one bacteria to another bacteria through virus.

44. Transduction is the process which needs bacteriophage.

45. The genetic material of HIV is single stranded RNA.

46. Prophage is a phage [viral] genome inserted and integrated into the circular bacterial DNA chromosome.

47. Viroids are extremely simple infectious agents which consists only small RNA genome generally ssRNA not enclosed by protein coat.

48. Outer covering of virus eg : TMV, is made up of protein called cpasid.

49. Prophage is virus genome that is incorporated and integrated into the DNA of a host cell.

50. TMV contains ssRNA.

51. Virus contains single type of nucleic acid, either DNA or RNA and protein coat.

52. Ribosomes are not present in the animal viruses.

53. Viruses are modified plasmids which infact the fragments of the nucleic acids of the host.

54. Cauliflower mosaic virus contains dsDNA while wound tumor and reovirus have dsRNA.

55. SARS is a contagious and life-threatening respiratory infection caused by SARS coronavirus.

56. Prions are infectious agents, made up of proteins only.

57. Viruses cause desease and replicate when they are in host cell only. Out side the host cell they remain dead.

58. Viroids differ from viruses as they are naked RNA molecules only not enclosed in protein coat.

59. Mosaic disease in tobacco is caused by a virus named tobacco mosaic virus.

60. TMV is rod shaped virus, measuring approximately 3000 A^0 in length and 180 A^0 in diameter.

61. An isolated chromosome and virus both require the environment of a cell to replicate.

62. Virion is fully assemble particle of virus which is capable of infecting the host.

63. Generally plant virus contains RNA.

64. Enzymes are generally absent in the Virus as it is non-cellular, non-cytoplasmic.

65. $\phi \times 174$ virus contains ssDNA.

66. Viroids are naked RNA molecules only which are not enclosed in protein coat.

67. TMV is virus which is obligate parasite and require cellular organization to replicate.

68. Size of TMV is 300 nm long and 18 nM diameter.

69. AIDS virus HIV is a lentivirus [slowly replicating retrovirus] which possess the enzyme reverse transcriptase.

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