DEPARTMENT OF BOTANY

NAMBOL L. SANOI COLLEGE, NAMBOL

QUESTION BANK

6TH Semester B0T: SE H--608 (HONOURS)

PREVIOUS 5 YEARS (2016-2020)

PAPER-VIII/ BOT: SE H-608: ECOLOGY, PLANT PHYSIOLOGY, BIOCHEMISTRY AND MOLECULAR BIOLOGY

UNIT-1: ECOLOGY

VERY SHORT ANSWER TYPE

(1 MARK QUESTIONS)

a) Identify one positive and one negative impact of dam on mankind. (2016)

b) What is the main objective of agroforestry? (2016)

c) Distinguish between heliophytes and sciophytes on the basis of morphological features. (2016)

d) Expand the term IPCC. (2016)

e) What are aquaporins? (2016)

f) Define biodiversity hot spot. (2017)

g) Name one type each of positive and negative biotic interactions in an ecosystem. (2017)

h) Name a dominant plant species present in the mangrove forest of Sunderbans. (2017)

i) Mention one ecological ill effect resulted from the excessive extraction of timber from forest. (2017)

i) What is drought? (2018)

k) Distinguish between Reforestation and Afforestation. (2018)

l) What is photochemical smog? (2018)

m) Differentiate between Habitat and Niche. (2018)

n) What is a Mangrove Forest? (2019)

o) Distinguish between natural vegetation and wildlife. (2019)

p) What is an ecological imbalance? (2019)

q) List the three main levels of biodiversity. (2019)

r) What is timber extraction? (2020)

s) What is meant by green energy? (2020)

u) Define Ten Percent (10%) Rule. (2020)

v) What does high BOD value in water indicate? (2020)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

a) Mention any three adaptations met within mangrove plants. (2016)

b) Discuss how deforestation is related with the frequent occurrence of flood in Imphal valley during rainy season. (2016)

c) Write a short note on ecological pyramids. (2016)

d) Distinguish between primary and secondary air pollutants by giving examples. (2016)

e) What are the objectives of social forestry and agroforestry? (2017)

f) Distinguish between conventional and non-conventional sources of energy with examples. (2017)

g) Sketch a diagrammatic representation depicting grazing food chain and detritus food chain with a brief explanation. (2017)

h) What are the main causes of river water pollution in Manipur? (2017)

i) Why are evergreen forest composed of thick vegetation and dense foliage? (2018)

j) What are mineral resources? Mention two mineral resources found in Manipur believed to have huge potential for the economic growth of the state. (2018)

k) What is the difference between global warming and climate change? Discuss it. (2018)

l) Why is biodiversity so important and worthy of protection. (2018)

m) What are the benefits of social forestry to the rural India? (2019)

n) Explain briefly .Why man is trying to use more and more of solar energy in place of coal and petroleum. (2019)

o) What is trophic level? Name the trophic levels in an ecosystem and mention their function. (2019)

p) List the various parameters used in order to study the quality of water. (2019)

q) What are solid wastes? Make a list of different types of solid waste on the basis of sources and characteristics. (2020)

r) Explain in short the concept of 3R's in solid waste management. (2020)

s) What is agroforestry? Mention any two advantages and disadvantages each of agroforestry (2020)

u) Despite facing serious power shortage in North-East India, construction of mega dams for generating hydroelectric power in this region is believed to have serious implications on the ecosystems and inhabitants of this area. Suggest any three serious implications. (2020)

ESSAY TYPE (12 MARKS QUESTIONS)

1. a) Characterize the main vegetation of eastern Himalayas and Western Himalayas. (2016)

   b)'Fossil fuels are depleting very fast and there is little success in population check"Comment and discuss on the alternation energy resources to solve the problem to certain extent. (2016)

2. a) Keeping in view, the laws of thermodynamics ,elaborate the energy flow in a typical ecosystem. (2016)

   b) Describe the various causes of biodiversity loss. (2016)

3. a) Enumerate at least six important forest types of India (Champion and Seth, 1960).Mention the characteristic features of tropical evergreen and tropical deciduous forest. (2017)

   (b) In recent times, environmentalists, journalists, social activists, lawyers, academicians and many NGO's have taken up a cry against the construction of 'Loktak Downstream Project' in Manipur. Can you suggest some possible reasons behind this? (2017)

4. a) Compare the structural components of a typical pond ecosystem with that of a forest ecosystem. (2017)

   b) Is ozone in the atmosphere useful or harmful to us? Discuss the threats to its depletion in atmosphere. (2017)

5. a) Give an account of energy resources which are less environmental friendly and also suggest some alternative that can replace the most polluting energy resources. (2018)

   b) Suggest two points each of advantages and disadvantages of the ITHAI DAM built on the Imphal river. (2018)

6. a) Give an account of the effects of light and temperature on the distribution of plants. (2018)

   b) What is solid waste management? Describe the activities involved in solid waste management system. (2018)

7. a) Under natural situations organisms in an ecosystem live together interacting among themselves directly or indirectly . Discuss various types of biotic interactions taking place in an ecosystem. (2019)

   b) Climate change is a natural phenomenon and has always been occurring over earth's history many a times, then why do we worry about climate change today? Give reasons and also mention the imminent threats posed to mankind. (2019)

8. a) Keeping in view on the alarming rate of depletion of forest cover all over the world, suggest the various methods being practiced for the conservation of forest. (2019)

   b) Write your view on the water resources scenario in Manipur. (2019)

9. a) Describe various ecosystem services (direct and indirect services) rendered by forest for the well-being of mankind. (2020)

10. a) Discuss the role of light and rainfall in affecting plant distribution. (2020)

b) Describe the major causes responsible for biodiversity loss. (2020)

UNIT-2: PLANT PHYSIOLOGY

VERY SHORT ANSWER TYPE

(1 MARK QUESTIONS)

a) Why is nitrogen deficiency syndrome first observed in the old and matured leaves of plant? (2016)

b) What is critical photoperiod? (2017)

c) Name a stress hormone in plant that functions during drought. (2017)

d) Define Blackmann's law of limiting factor. (2018)

e) What is the difference between phytohormone and phytochrome? Give only one point. (2018)

f) Suppose thylakoid lamellae are taken out of form a chloroplast and kept suspended in an aqueous medium in presence of CO_2 and light. Will these lamellae synthesize glucose or not? Give reason. (2019)

g) What is Richmond-Lang effect? (2019)

h) How does Leghaemoglobin protect nitrogenase enzyme? (2020)

i) Why is nitrogen deficiency observed first in oid and matured leaves? (2020)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

a) Distinguish between auxin and gibberellin in terms of their physiological effects in plant growth and development. (2016)

b) Discuss the reversible photoreaction of phytochrome in governing initiation of flowering. (2016)

c) Why is TCA cycle aerobic even though oxygen is not required in the reactions of TCA cycle? (2016)

d) Define senescence in plants. Name the four types of senescence. (2017)

e) Depict a labeled diagram showing the symplast and apoplast pathways of water movement in root. (2017)

f) What is leghemoglobin? Describe its role in symbiotic nitrogen fixation. (2018)

g) Distinguish between active and passive ion absorption with only three points. (2019)

h) Describe the photo reversibility of phytochrome in inducting flowering in plants. (2019)

i) In agricultural and horticultural practices, which plant hormone is usually employed for (2020)

(i) initiating rooting in the cut stem;

(ii) breaking seed dormancy;

(iii) delaying senescence of leaf;

(iv) ripening of fruits;

(v) Controlling weeds;

(vi) reducing transpiration;

f) In an experiment, it was found that the absorption of K^+ ions by plants was inhibited by the application of respiratory inhibitors. What conclusions can be drawn from the finding? Discuss it. (2020)

ESSAY TYPE (12MARKS QUESTIONS)

1. a) Depict the biochemical steps of symbiotic nitrogen fixation and mention the role of leghaemoglobin. (2016)

   b) Discuss the behavior of RuBisCO under high oxygen concentrationin presence of high in C_3 plants. (2016)

2. (a) Describe the mechanism of light absorption and energy transfer during the process of photosynthesis. (2017)

   Or

   Explain in detail the phenomena of Red drop and Emerson effect in the process of photosynthesis.

   b) List the names of essential micro-elements in plant mineral nutrition. Discuss the physiological roles of molybdenum and copper. (2017)

3. (a) Trace the biochemical pathways of photosynthetic carbon oxidation(PCO) cycle pointing out the involvement of different organelles in the process.

   (b) Discuss some important functions of auxins and cytokinins in the growth and development of plant. (2018)

4. (a) Review the mechanism of biological nitrogen fixation leading to the formation of ammonia(NH3).(2019)

(b) Give the reactions of photosynthetic carbon reduction (PCR) cycle in a flowchart showing product formation and regeneration of acceptor molecule. (2019)

5. (a) Compare non-cycle and cyclic electron transport in photosynthesis with six points. (2020)

(b) Write an account of phytochrome on the basis of its types, photo reversibility and physiological effects. (2020)

UNIT-3: BIOCHEMISTRY

VERY SHORT ANSWER TYPE

(1 MARK QUESTIONS)

a) If one DNA sample has a melting point of 85.5°Cand another shows a melting temperature of 85°C, what might you conclude regarding the base composition of the two samples? (2016)

b) Give one point of difference between hydrogen bond and hydrophobic bond. (2016)

c) What is allosteric enzyme regulation? (2016)

d) What is standard free energy change? (2017)

e) Define Km. (2018)

f) Distinguish between Prokaryotic and Eukaryotic m-RNA with only one point. (2018)

g) Write an equation indicating the relationship between free energy change and redox Potential gradient. (2019)

h) Give a point of difference between hydrogen bond and covalent bond.(2019)

h) In th equation $\Delta G'^{\circ} = -nF\Delta E'^{\circ}$, what does n stand for ? (2020)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

a) The standard redox potential (E^{o}) values of NAD^{+}/NADH and pyruvate/lactate conjugate pairs are -0.32V and -0.185 V respectively .Calculate the standard free energy change (AG^{0}) for the conversion of pyruvate to lactate (F=96480 J/V mol).(2016)

b) By using lineweaver and Burke equation, calculate K_m for an enzyme when [S] = 40μM, $V_{\circ}$ = 9.6 μM Sec^{-1} and Vmax = 12 μM Sec^{-1}. (2017)

c) An acetic and solution is found to contain ten times acetate ions as that of undissociated acid. Calculate the pH.(pKa of acetic acid = 4.76 (2018)

d) Draw the molecular structure of (i) NADP and (ii) ATP. (2018)

e) Calculate V_{o}/Vmax ratio when [S] =2 km by using Michaelis-Menten equation. (2019)

f) Draw and label a diagrammatic sketch of initiation complex of protein synthesis (2019)

g) Give Lineweaver-Burk equation. Write its significance in enzyme kinetics.(2020)

h) "Biochemical energy transformation in living organisms does not violate the second law of thermodynamics". (2020)

ESSAY TYPE (12 MARKS QUESTIONS)

1. a) Derive Michaelia Menten equation.(2016)

b) Describe the role of water in living systems. (2016)

2. Why buffers are essential in biochemical systems? (2017)

3. a) Describe the relevance of first and second laws of thermodynamics in living systems. (2018)

b) Trace the pathway through which the energies extracted from the complete oxidation of glucose to carbon dioxide is channeled up to (a) "Without water we cannot expect life on earth". Justify the statement by giving more emphasis on the biochemical basis of life. (2018)

4. a) "Without water we cannot expect life on earth". Justify the statement by giving more emphasis on the biochemical basis of life. (2019)

b) Describe the different biochemical steps of EMP pathway with enzymes involved at each step. (2019)

5. Illustrate diagrammatically the different steps of TCA along with enzymes involved in each step.

UNIT-4: MOLECULAR BIOLOGY

VERY SHORT ANSWER TYPE

(1 MARK QUESTIONS)

a) What is a genomic library? (2016)

b) Give a point of difference between fMet-tRNA fMet and MettRNAMet.(2017)

c) What are molecular probes? (2017)

d) What is the role of RNA in DNA replication? (2017)

e) What are the selectable markers? (2018)

f) What is gel electrophoresis? (2018)

g) Mention the role of leader sequence in gene expression. (2019)

h) What is Taq Polymerase? (2019)

i) Why is mRNA unstable? (2020)

j) Deferentiate between replisome and primosome. (2020)

k) Give a point of similarly between NAD+ and FAD+. (2020)

SHORT ANSWER TYPE

(3 MARKS QUESTIONS)

a) Write a short note on restriction endonucleases with reference to its use in recombinant DNA technology. (2016)

b) Give a generalised two-dimensional cloverleaf model of t-RNA. (2016)

c) Name the different types of cloning vectors. Why are they necessary in gene cloning? (2016)

d) Four samples (A, B, C and D) of nucleic acid are analyzed for the proportion of different bases present, with the following results: (2017)

Sample A – A = 30%; C = 30%; G = 20%; T = 20%

Sample B - A = 27.5%; C = 22.5%; G = 22.5%; T = 27.5%

Sample C – A = 18%; C = 32%; G = 18%; U = 32%

Sample D – A = 18%; C = 32%; G = 32%; U = 18%

Which of these samples are DNA and which are RNA? Identify also double-stranded and single-stranded DNA and RNA samples.

e) Give the molecular structure of adenosine triphosphate. (2017)

f) Distinguish between particle contain double stranded DNA with 2 X10^5 base pairs- (2018)

(i) how many nucleotides would be present.

(ii) how many complete spirals would the molecule have;

(iii) What would be the length of the DNA in millimeter?

g) Differentiate between A-DNA and B-DNA with three points. (2019)

h) Mention the DNA polymerases found in prokaryotes and explain their functions. (2019)

i) Distinguish between positive and negative gene regulation in prokaryotes. (2020)

j) Distinguish between prokaryotic and eukaryotic DNA polymerase (only three points). (2020)

ESSAY TYPE (12 MARKS QUESTIONS)

1. a) Describe the Sanger's method for sequencing a DNA fragment. (2016)

b) Describe the coordination of leading and lagging strands in the replication of DNA mentioning the roles of various enzymes involved. (2016)

2. a) Describe the structure of RNA polymerase of *E. coli* and discuss the roles of different components of this enzyme in RNA synthesis in DNA template. (2017)

3. a) Describe the basic principle and methodology involved in PCR. (2017)

b) Describe the mechanism of negative control of gene activity provided in 'lac' operon in *E. coil.* (2017)

4. a) What are restriction endonucleases ? Give an account of classification and nomenclature of restriction endonucleases. (2018)

b) Discuss how DNA is packaged in an eukaryotic chromosome. (2018)

5. a) Explain Sanger's dideoxynucloetide synthesis method of DNA sequencing. (2019)

(b) What is RNA splicing? How does mRNA splicing differ from tRNA splicing? (2019)

6. a) What are genomic and cDNA library / Describe the steps involved for the construction of genomic and cDNA library with the help of labeled diagram.(2020)

b) Discuss the steps involved in the formation of initiation complex during protein translation in prokaryotes. (2020)