Sikkim Public Service Commission

Main Written Examination for the Post of Sub Inspector

PAPER - II BOTANY

Time allowed: 3.00 Hrs | Maximum Marks: 250

INSTRUCTION TO CANDIDATES

***Read the instructions carefully before answering the questions*: -**

1. **IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.**
2. **Use only Black Ball Point Pen to fill the OMR Sheet.**
3. Do not write anything else on the OMR Answer Sheet except the required information.
4. **This Test Booklet contains 50 questions in MCQ Mode in Part I to be marked in OMR Sheet. Part II and Part III are Subjective Questions which have to be written on separate answer sheet provided to you.**
5. Before you proceed to mark in the Answer Sheet (OMR), you have to fill in some particulars in the Answer Sheet (OMR) as per given instructions.
6. After you have completed filling in all your responses on the Answer Sheet (OMR) and the examination has concluded, you should hand over the Answer Sheet (OMR) and separate answer sheet to the Invigilator only. You are permitted to take with you the Test Booklet.
7. **Marking Scheme**

   THERE WIL BE NEGATIVE MARKING FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBECTVE TYPE QUESTIONS

   i. There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, one-third of the marks assigned to the question will be deducted as penalty.
   ii. If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct and there will be same penalty as above to the question.
   iii. If a question is left blank. i.e., no answer is given by the candidate; there will be no penalty for that question.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

PART-I

Choose the correct option for the following: **(3X50=150)**

1. **Which of these is not an example of sexual reproduction in bacteria?**

   A. Transfusion
   B. Transformation
   C. Transduction
   D. Conjugation

2. **Bacteria utilized for making Yoghurt is:**

   A. Lactobacillus acidophilus
   B. Lactobacillus lactis
   C. Lactobacillus vulgericus
   D. Lactobacillus baloricus

3. **In homo-sapiens infertility is caused by which organism?**

   A. Mycoplasma pneumonia
   B. Mycoplasma homonis
   C. Mycoplasma salivarium
   D. Mycoplasma fermentans

4. **Organism which have RNA as genetic material but without protein envelop is?**

   A. Virus
   B. Viroid
   C. Bacteria
   D. Bacteriophage

5. **"Green ear" disease for pearl millet is caused by:**

   A. Albugo candida
   B. Sclerospora
   C. Aspergillus
   D. Achinospora

6. **The fungi which is edible is:**

   A. Agaricus
   B. Aspergillus
   C. Alternaria
   D. Albugo

7. **Black point disease on wheat grain is caused by?**

   A. Aspergillus triticina
   B. Aspergillus solani
   C. Aspergillus tenuis
   D. Aspergillus brassicae

8. **Diatoms are found in?**

   A. Rhodophyceae
   B. Chlorophyceae
   C. Xentophyceae
   B. Bacileriophyceae

9. **The example of a phytoplankton is:**

   A. Volvox
   B. Ectocarpus
   C. Sargassum
   D. Ulva

10. **Vascular system is absent in:**

   A. Gymnosperm
   B. Bryophyta
   C. Pteridophyte
   B. Angiosperm

11. Which algae is present in mucilaginous cavities of Anthoceros?

A. Chara

B. Coleochaete

C. Nostoc

D. All above

12. An extra copy from selected plant in taxonomy is called?

A. Isotype
B. Neotype
C. Holotype
D. Co-type

13. Indian herbariums are classified on which system of classification?

A. Engler and Prantle
B. Bentham and Hooker
C. Armen and Takhtajan
D. Mendel and Linnaeus

14. "⊕" symbol, used for describing a floral formula is?

A. Actinomorphic
B. Bracteolate
C. Zygomorphic
D. Hermetomorphic

15. Plant whose leaf juices is called as "Soral Pai" is

A. Hibisicuscannabinus
B. Hibisicuselatus
C. Hibisicussabdarifa
D. Hibisicusmutabilis

16. Thigmonastic movements are found in which plant?

A. Lathyru saphaca
B. Lathyrus odoratus
C. Mimosa pudica
D. Cassia fistula

17. Which of the following plants do not have medicinal value?

A. Angelica archanglica
B. Centelaasiatica
C. Ferulaasa-foetida
D. Eryngium plannum

18. Bringraj oil is extracted from?

A. Helianthus annuus
B. Carthamus tinctorial
C. Ecliptaprostrata
D. Inula helenium

19. Alkaloids of which plants in family Apocynaceae are used for cancer treatment?

A. Apocynum
B. Wringhtia
C. Tabernaemontana
D. Catharanthus

20. Which of the following interaction is a major contributor for proteins stability in non-polar environment?

A. Ionic interaction
B. Hydrogen bonding
C. Van der Walls interaction
D. Hydrophobic interaction

21. Which of the following structure -function pairs is not correct?

A. Nucleolus---RNA synthesis
B. Lysosomes---intracellular digestion
C. Endoplasmic reticulum---glycosylation
D. Microtubules-----muscle construction

22. Which of the following compounds is not a part of alkaloid class of secondary metabolites?

A. Indole
B. Lignin
C. Tropane
D. Pyrroidine

23. Due to global warming, species of plants and animals can generally be expected to migrate from:

A. Higher altitudes to lower altitudes

B. Lower altitudes to higher altitudes

C. West to east along a given latitude

D. East to west along a given latitude

24. C4 plants and CAM plants are similar in their photosynthetic adaptations in which of these respects?

A. In both cases the stomata normally close during the day

B. Both types of plants make their sugar without the calvin cycle

C. In both case an enzyme other than RUSISCO carriers out the first step in carbon fixation

D. Both type of plants makes most of their sugar in the dark.

25. A weed, growing in a lake, doubles in an area every week. If it takes a month for it to cover the entire surface of the lake, how long does it take for 1/4th of the surface?

A. 0.5 week

B. 1.5 week

C. 2.0 week

D. 1.0 week

26. If temperature increases by more than 4^{0}C due to the global warming, the most likely impact on forests in the tropics would be:

A. Stimulated growth of trees resulting in increased biomass

B. Increase in the diversity of tress in tropical forests

C. Increase in respiration over photosynthesis resulting in decreased biomass

D. Migration of temperature tree species to the tropics.

27. **Mitochondrial genes are different from nuclear genes in that, mitochondrial genes:**
    A. Have fewer stop codon
    B. Do not have intron
    C. Have different start codon
    D. Are shorter than nuclear genes

28. **All the following may be considered as site for secondary succession EXCEPT:**
    A. An abandoned agricultural field
    B. A bare rock shelf on a mountain side
    C. A forest gap resulting from a tree fall
    D. A hurricane damaged forest

29. **A community with low species diversity and high dominance is said to be:**
    A. Productive but unstable
    B. Both productive and stable
    C. Neither productive nor stable
    D. Unproductive but stable

30. **Which of the following is not an endangered plant species?**
    A. Ceropegiamahabalei
    B. Butea monosperma
    C. Fimbristylishirstufolia
    D. Ischaemumjayachandranii

31. **Among the following events in history of life--**
    A. Prokaryotic cell
    B. Eukaryotic cell
    C. Natural selection
    D. Organic molecules
    E. Self-replicating molecule

Which is the correct chronological order?

A. d→e→c→a→b

B. e→d→a→c→b

C. d→e→a→b→c

D. d→e→a→c→b

32. Which of the following organism, is widely used as a biocontrol in organic farming?

A. . *Rhyzobiumtropicii*

B.. Trichoderma viridis

C.. Fusarium oxysporum

D.. Nostocmuscorum

33. In which of the following places would you except the highest number of plant species per hectare of forest?

A. Corbett National Park

B. Ranthambore National Park

C. Mudumalai National Park

B. Silent Velley National Park

34. Which of the following is the characteristic of a climax community?

A. Wide niche

B. Low species diversity

C. High community production

D. Open mineral cycle

35. Fertilizer washed into rivers by the rain can cause ____?

A. Bioaccumulation

B. Biodegradation

C. Biomagnification

D. Eutrophication

36. The maximum possible rate of increase of population of a given species under ideal conditions would depend upon its:

A. Biotic potential

B. Potential natality

C. Carrying capacity

D. Biomass

37. Which of the following regents would be useful for visualizing DNA restriction fragments that have been separated by electrophoresis in an agarose gel and remain in the wet gel?

A. Ethidium bromide

B. ^{32}Pi

C. Alpha ^{32}Pi ATP

D. Diphenylamine

38. Which one of the following is a non-parametric test?

A. t-test

B. X^2-test

C. f-test

D. ANOVA

39. Standard deviation of a data is 6. When each observation is increased by 1, then the standard deviation of new data is?

A. 5

B. 7

C. 6

D. 8

40. Which of the following involves the combining of two cells without cell walls from different plants?

A. Protoplast fusion

B. Clonal propagation

C. Hybridization

D. Mutant selection

41. Non-polar amino acid residues are found mostly:

A. In the core of proteins

B. On the surface of proteins

C. On alpha helix

D. In no specific region

42. Given is the random order of chromatin organization:

i. Nucleosome
ii. Solenoid
iii. Double stranded DNA
iv. Chromosome

Choose the correct sequence

A. I, IV, II, III

B. III, I, II, IV

C. I, II, III, IV

D. III, IV, I, I

43. Respiratory quotient (R.Q) value of a simple sugar is:

A. Zero

B. More than one

C. Less than one

D. Equal to one

44. DNA can be radiolabelled with?

i). P^{32}

ii). I^{125},

iii). N^{15},

iv). S^{35}

A. I, II and III are correct

B. I and III are correct

C. I, III and IV are correct

D. II and IV are correct

45. Which of the following is a food borne toxin?

A. Tetanus toxin

B. Botulinum toxin

C. Cholera toxin

D. Diptheria toxin

46. Which one of the following compounds is NOT a part of alkaloid class of secondary metabolites?

A. Lignin

B. Indole

C. Tropane

D. Pyrroidine

47. The herbicide,dichlorophenyldimethylurea, is an inhibitor of

A. Shikimate pathway for biosynthesis of aromatic amino acids.

B. Electron transport from P680 to P700

C. Branch in amino acid pathway

D. Electron transport from P700 to ferrodoxin.

48. An alga is having chlorophyll a, floridean starch as storage product and lacking flagellate cells ,belongs to the class :

A. Phaeophyceae

B. Chlorophyceae

C. Rhodophyceae

D. Xanthophycea

49. During eukaryotic cell division, metaphase to anaphase transition is regulated by degradation of?

A. Cyclin B1

B. CDK-1

C. Aurora A kinase

D. Polo like kinase

50. Identify the plant species from which artemisinin, an anti-malarial drug, is extracted?

A. Artimisiamaritima

B. Artimisiascoparia

C. Artimisiaannua

D. Cinochona officinali

PART - II

Attempt ANY TWO of the following **(25X2=50)**

1. (a) What are GM crops? Make a protocol for making new salinity tolerance with high yield producing variety by using molecular techniques?

   (b) Explain lac-operon theory of gene expression. Write short notes on Griffith experiment that prove "DNA is genetic material".

2 Write notes on:

a) Amino acid structural form and Protein structure.
b) Differentiate between C4 and CAM plant with suitable example.
c) Cyclic and Non-cyclic photo-phosphorylation.
d) Structure of a monosaccharide and isomerism.
e) Describe all RNA present in cell.

3. (a) What is organic farming? Write its advantage and describe two biofertilizers and two biopesticides?

   (b) What is bioenergy? Explain all the generation bioenergy resource. Micro-algae are suitable bioenergy resource in current scenario, explain?

4 . Write the short notes on Following:

i. Critical endangered species.
ii. Red data book.
iii. Hot spot of India.
iv. Recombination and Linkage.
v. Genetic disorder and Klinefelter syndrome.
vi. What is Mutation and explain mis-sense and non-sense mutation.
vii. Crossing over and significance.
viii. Inversion and test cross.
ix. Pleiotropy and albinism.
x. Heterochromatin and euchromatin.

xi. Speciation and splicing.

xii. Soma-clonal variation.

xiii. Function of nucleolus.

5: (a) Make chlorophyll-a labelled diagram and explain antenna molecules and their role.

(b) Explain the mechanism of phloem transport and factors regulating transport of nutrients.

(c) What is the significant application of plant tissue culture and recombinant DNA technologies?

PART - III

Attempt ANY FIVE of the following: **(10×5=50)**

1 . (a) Explain cell structure and culturing of "jokers of plant kingdom"?(3+2)

(b) Explain the structure of Bacteriophage.What is Lytic Cycle and Lysogenic Cycle of Phage?

2. Give short notes on:

a. Pyrenoids

b. Hologamy

c. Alteration of generation

d. Quorum Sensing

e. Sexduction

3. (a) What is sclerotium and para-sexuality in fungi?

(b) Explain the life cycle of Fungi and write short notes on Mycorrhiza.

4. (a) Explain germination of Oospore in Albugo?

   (b) What is Omega taxonomy? Differentiate between Monograph and Herbarium?

5. (a) Describe the androecium and gynoecium of Brassicaceae.

   (b) Write about its economic importance. Write the floral formula and draw the floral diagrams of *Brassica junacea*.

6. Explain the following:

   a) Pollination in Salvia.
   b) Application of Obturator and Filiform Apparatus during fertilization in Angiospem.
   c) Differentiate between Parthenocarpy and Apomixis .
   d) Polyembryony and Double fertilization

7. **Answer the following:**

   a) Give the names of any five plant hormones and explain their application.
   b) What is photoperiodism? Explain about Short Day Plants and Long Day Plants
   c) Define Seed dormancy, Seed germination and Biological clock.

8. (a) What is nucleoplasmic and cytoplasmic inheritance? Explain cytoplasmic inheritance in *Paramecium*.

   (b) What is evolution and application of Hardy Weinberg theory in evolution.
