Code No.	N – 3569

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2022

CSS

GENETICS AND PLANT BREEDING

General Instructions

1. The Question Paper is having two Parts — Part 'A' Objective type (60%) & Part 'B' Descriptive type (40%).
2. Objective type questions which carry 1 mark each are to be (✓) 'tick marked' in the response sheets against the appropriate answers provided.
3. 8 questions are to be answered out of 12 questions carrying 5 marks each in Part 'B'.
4. **Negative marking** : 0.25 marks will be deducted for each wrong answer in Part 'A'.

Time : 2 Hours **Max. Marks : 100**

To be filled in by the Candidate									
Register Number	in Figures								
	in words								

PART – A

(Objective Type)

Choose appropriate answer from the options in the questions. **One** mark **each**.

(60 × 1 = 60 marks)

1. The ground tissue system incorporates three cell types. Choose the correct one from the following
   a) parenchyma, collenchyma, sclerenchyma
   b) sclereids, fibers, xylem
   c) epidermis, stomata, trichomes
   d) epidermis, parenchyma, sclereids

---

2. The special passageways seen in the cell wall of the plants through which plant cells communicate and permit small substances to pass directly from cell to cell are called as

   a) Plasmodesmata
   b) Stomata
   c) Gap junctions
   d) Tight junctions

3. Girdling, removing a ring of bark from around a tree, can be lethal to the tree. Because the bark of the free contains

   a) Xylem
   b) Pholem
   c) Phellum
   d) Phellogen

4. The typical angiosperm female gametophyte is

a) seven-cell, eight-nucleus structure

b) eight-cell, seven-nucleus structure

c) seven cell, seven nucleus structure

d) called as microgametophyte

5. Match the following

1. Monosporic p. Allium type

2. Bisporic q. Adoxa type

3. Tetrasporic r. Polygonum type

a) 1-p, 2-q, 3-r b) 1-r, 2-p, 3-q

c) 1-r, 2-q, 3-p d) 1-q, 2-r, q-p

6. Which of the following helps to protect cells inside the endodermis from flooding?

a) Cork b) Phelloderm

c) Lenticels d) Casparian strips

7. What is an experimental variable?

a) A factor of the experiment being tested

b) Result or change that occurs

c) Dependent Variable

d) Responding Variable

8. Which of the following is the correct taxonomic hierarchy

a) Domain, kingdom, division, class, order, family, genus, species

b) Domain, division, kingdom, order, class, family, genus, species

c) Kingdom, division, domain, class, order, family, genus, species

d) Domain, kingdom, division, order, class, family, genus, species

9. Which of the following is not a measure of dispersion?

a) Standard deviation
b) Mean
c) Range
d) Variance

10. Which of the following is an incorrect comparison between light and electron microscope?

Light microscope	Electron microscope
a) Uses beam of light	Uses beam of electron
b) Uses lens made up of glasses	Uses electromagnetic lens
c) Always killed and stained specimens are used	Live specimens are used
d) Magnification is lesser	Magnification is greater

11. A researcher tries to purify a globular protein having a molecular mass of 150,000 daltons. This protein is present in solution with two contaminating proteins of similar shape, one much larger at 350,000 daltons and the other much smaller at 55,000 daltons. He employed Gel Filtration Chromatography in which the mixture is passed through a column of Sephadex G- 150 beads, which allows entry to globular proteins that are less than about 200 kDa. Which of the following does not occur during the process?

a) When the protein mixture passes through the column bed, the 350 kDa protein is unable to enter the beads and remains dissolved in the moving solvent phase. As a result, the 250 kDa protein is eluted as soon as the preexisting solvent in the colunm (the bed volume) has dripped out
b) The 150 kDa protein and 55 kDa can diffuse and moves at different rates and 150-kDa protein is eluted in a purified state
c) The 150 kDa protein and 55 kDa can diffuse and moves at different rates and the 150-kDa protein is eluted in a purified state while the 55-kDa protein remains in the column
d) The 150 kDa protein and 55 kDa can diffuse and moves at different rates and the 55-kDa protein is eluted in a purified state while the 150-kDa protein remains in the column

12. Which of the following properties of water is not due to H- bonding

a) High specific heat capacity
b) High heat of evaporation
c) Cohesive property of water
d) Adhesive property of water

13. Rhizobium is a
    a) Gram-positive bacteria
    b) Parasitic bacteria
    c) Gram-negative, nitrogen-fixing bacteria
    d) Gram-positive, nitrogen-fixing bacteria

14. Which of the following group of algae lack flagella and centrioles?
    a) Chlorophyceae
    b) Rhodophyceae
    c) Phaeophyceae
    d) Xanthopyceae

15. Which of the following is true regarding the caroposporophyte and tetrasporophyte?
    a) Carposporophyte is a diploid thallus that produces carposporangia containing diploid carpospores
    b) Carposporophyte is a diploid thallus that produces carposporangia containing haploid carpospores
    c) Tetrasporophyte is a haploid structure that produces tetrasporangia containing haploid tetraspores
    d) Tetrasporophyte is a haploid structure that produces tetrasporangia containing diploid tetraspores

16. The teleutospore of *Puccina* are
    a) Stalked two-celled diploid
    b) Stalked one-celled diploid
    c) Stalked two-celled haploid
    d) Stalked one-celled haploid

17. Which fungal phylum is best represented in lichens?
    a) Basidiomycota
    b) Ascomycota
    c) Zygomycota
    d) Deuteromycota

18. Which of the following is true about phytoalexins
    a) Phytoalexins are toxic compounds produced in pathogens for infecting plants
    b) It is produced by the damaged and necrotic cells
    c) It is produced during compatible biotrophic infection
    d) It is produced by healthy cells adjacent to localised damaged and necrotic cells in response to materials diffusing from damaged cells

19. The most conspicuous and dominant generation of the life cycle of bryophytes is
    a) Diploid gametophyte
    b) Haploid gametophyte
    c) Diploid sporophyte
    d) Haploid sporophyte

20. Which of the following is not a characteristic of bryophytes
    a) They are devoid of vascular tissues
    b) Sexual reproduction is oogaxnous type and the sex organs are non-jacketed and muticellular
    c) They need water for fertilization
    d) The sporophytic generation is dependent on gametophytic generation

21. Which of the following is not true about siphonostele
    a) The central xylem core is replaced by parenchymatous cells called as pith
    b) Perforted siphonostele is called as solenostele
    c) A siphonostele with leaf gap is called as cladosiphonic siphonostele
    d) In amphiphloic siphonostele, phloem is present on both sides of xylem

22. The sporangia are borne in groups (trilocular) and form synangia in
    a) *Selaginella*
    b) *Psilotum*
    c) *Pteris*
    d) *Marselia*

23. Non-durable and non-compact wood with large amount of parenchyma, large pith and cortex with less amount of xylem trachieds or wood is called as
    a) Manoxylic wood
    b) Pycnoxylic wood
    c) Sap wood
    d) Compression wood

24. The correct chronological order of periods in geological time scale is
    a) silurian→devonian→permian→carboniferous→cretaceous→triassic→ jurassic→cambrian
    b) cambrian→ordovician→devonian→silurian→permian→carboniferous→ triassic→jurassic→cretaceous→teritary→quaternary
    c) cambrian→ordovician→devonian→carboniferous→cretaceous→triassic→ jurassic→teritary→quaternary
    d) cambrian→ordovician→silurian→devonian→carboniferous→permian→ triassic→jurassic→cretaceous→teritary→quaternary

25. When older flowers have long pedicels that younger flowers, all the flowers come in same level. This type of inflorescence is called as

a) Head
b) Umbel
c) Corymb
d) Catkin

26. Which of the following is an artificial system of classification?

a) Bentham and Hooker
b) Linnaeus sexual system
c) Engler and Prantl
d) Takhtajan System of Classification

27. The herbarium is defined as

a) The technique of drying and pressing plants
b) The store house of collected plant specimens
c) The technique involving drying, pressing and nomenclature of plants
d) The correct identification of plants and pasting them on a sheet after drying

28. The perianth of rice spikelet is

a) Palea
b) Lemma
c) Lodicule
d) Awn

29. Which of the following is not the characteristics of the family Ieguminosae?

a) Leaves are alternate and simple or compound. Compound leaves are pinnately compound. Leaves are stipulate and have swollen (pulvinate) leaf bases. They have reticulate venation
b) Flowers are generally zygomorphic, pentamerous and hypogynous
c) Stamens are diadelphous, ovary is superior, unilocular and has multiple ovules
d) Stamens are diadelphous, ovary is inferior, unilocular and has multiple ovules

30. Asafoetida is commercially exploited for

a) Resin
b) Oil
c) Dye
d) Latex

31. Because of this global warming is a concern
    a) Rare species will be affected severely as a result of climate change
    b) It is already too hot in the tropics.
    c) Climates have been so stable for thousands of years that many species cannot tolerate variable temperatures.
    d) Climate change is expected to occur at a faster rate than many species' ranges can shift.

32. Which of the following is not a feature of the ecosystem?
    a) It can be any ecological system with defined boundaries.
    b) It includes all the biotic and abiotic factors
    c) Materials cycle and energy flow through the ecosystem
    d) It includes only the living organisms.

33. 'What is an edge effect?
    a) It is the zone of junction or a transition area between two biomes
    b) It is a zone of gradual but continuous change from one ecosystem to another when there is no sharp boundary between the two in terms of species composition
    c) It refers to the changes in population or community structures that occur at the boundary of two habitats
    d) It has a habitat which is exactly similar to the adjacent ecosystems

34. Which of the following is not a threat to biodiversity?
    a) Habitat destruction and fragmentation
    b) Introduction of new species
    c) Overexploitation
    d) Emigration

35. The forest conservation act was implemented in the year
    a) 1980 b) 1972
    c) 1986 d) 1981

36. Which of the following are the characteristics of tropical evergreen forest?
    a) Tropical deciduous forests have taller trees and fewer succulent and they support a much greater number of plant and animal species
    b) Dominated by trees and vines. Rich in plant diversity
    c) Dominated by shrubs, small trees and grasses
    d) Dominated by low-growing shrubs and herbaceous plants

37. Which of the following are seen in a prokaryotic cell?
    a) Nucleus, plasma membrane, chromosomes, flagellum
    b) Cell wall, ribosomes, thylakoid, flagellum
    c) Cell wall, flagellum, mitochondria, plasma membrane
    d) Nucleoid, plasma membrane, ribosomes, Golgi apparatus

38. If the probability of being blood group B is ½ and probability of blood group AB is 1/8. Then what is the probability of being either blood group B or AB
    a) 1/5
    b) 1/10
    c) 5/8
    d) 1/16

39. Which of the following factors did not contribute to Mendel' s success in his study of heredity?
    a) The use of pea plant
    b) The seven characteristics he has chosen
    c) The experimental approach using mathematics
    d) He studied characteristics which showed a wide range of variation

40. Which of the following is wrong about the linkage?
    a) Genes located close together on the same chromosome are called linked genes and belong to the same linkage group
    b) Linked genes travel together in meiosis, and are not expected to assort independently
    c) Linked genes travel together during meiosis and assort independently Unstained living components of a cell can be visualized through
    d) Genes that are close together on the same chromosome usually segregate as a unit and are therefore inherited together

41. In evolution, the concept of fitness is

a) The reproductive success of an individual relative to other members of a population

b) The ability of an individual to complete with others

c) The dominance of an individual over other

d) The ability of an individual to adapt best to the environment

42. The wings of bats and the wings of birds are

a) Homologous

b) Structures that are anatomically similar because they are inherited from a common ancestor

c) Structures that are functionally similar because they are inherited from a common ancestor

d) Independently evolved traits subjected to similar selection pressures

43. Which of the following statements is not correct?

a) Water can enter the stele without crossing the symplast

b) The casparian strips block the entry of water between the endodermal cells

c) Water can freely move in the apoplast without entering cells

d) Symplast consist of interconnected cytoplasm of living cells

44. In a wilted plant the cell will have

a) Higher water potential

b) Lower water potential

c) Higher pressure potential

d) Higher osmotic potential

45. In seeds to break dormancy and initiate germination needs

a) A reduction in gibberellin and increase in abscisic acid

b) A reduction in abscisic acid and increase in gibberellin

c) A reduction in both gibberellin and abscisic acid

d) An increase in both gibberellin and abscisic acid

46. During photosynthesis in a non-cyclic electron transport chain, the fmal acceptor of the electron is

a) Oxygen

b) PSII

c) $NADP^+$

d) PSII

47. Which of the following is not a carbohydrate?

a) Lignin
b) Deoxyribose
c) Cellulose
d) Amylopectin

48. Which of the following is not true about enzymes?

a) Enzymes lower the energy barrier by lowering the equilibrium of a chemical reaction
b) An enzyme changes shape when it binds with the substrate
c) Prosthetic groups are distinctive, non-amino acid atoms or molecular groupings that are permanently bound to their enzymes
d) Cofactors are inorganic ions such as copper, zinc, and iron that bind to certain enzymes

49. If the sequence of DNA in one strand is 5' ATGCGGCAA 3' the sequence of the complementary strand will be

a) 5 UACGCCGUU 3'
b) 3'UACGCCGUU 5'
c) 3'TACGCCGTT 5'
d) 5'TACGCCGTI 3'

50. In the lac operon, when lactose is present and glucose is absent

a) The structural genes are not transcribed
b) The repressor binds with the operator
c) RNA polymerase cannot bind with the promotor
d) The repressor cannot bind to the operator

51. Which of the following is a sequence alignment tool?

a) CLUSTAL X
b) PIR
c) SWISS PROT
d) ENIPROT

52. Which of the following is a protein sequence database?

a) SWISS PROT
b) EMBL
c) Gen Bank
d) DDBJ

53. Air layering is also known as

a) Stooling
b) Mound layering
c) Gootee
d) Trench layering

54. Which of the following can be used for digging or turning over the soil, making bunds in the field and small plots?

a) Hoe
b) Spade
c) Shear
d) Secateurs

55. A sealable glass container with soil and plants, which is an enclosed ecosystem that mimics the natural world, or a miniature garden is called as

a) Terrarium
b) Trophy
c) Topiary
d) Bonsai

56. High yielding chick pea variety Pusa- 413, Pusa- 408 are a result of

a) Mutation breeding
b) Polyploidy breeding
c) Natural selection
d) Clonal selection

57. Which of the following is correct about emasculation?

a) Is the removal of stamens from the female parent
b) Is the removal of stamens from the male parent
c) Is the removal of stamens from the female parent before they burst and shed their pollen
d) Is the removal of stamens from both the parent plants before they mature and shed their pollen

58. Which of the following is not a principle of an experimental design?

a) Randomization
b) Blocking
c) Replication
d) Factor

59. What are Geographical Indications (GI) in IPR?

a) Distinguish the goods or services of one undertaking from those of other undertakings
b) Identify a good as originating in a place where a given characteristic of the good is essentially attributable to its geographical origin
c) It is the indication of a region, having rare and endangered species
d) It is the dominant vegetation type or any species which indicates the phytogeography of that particular region

60. An operating system that allows to run only one programme at a time is called as

a) Multitasking OS
b) Batch processing OS
c) Real time OS
d) Embedded OS

ANSWER SHEET — PART – A

1	A	B	C	D	E	21	A	B	C	D	E	41	A	B	C	D	E
2	A	B	C	D	E	22	A	B	C	D	E	42	A	B	C	D	E
3	A	B	C	D	E	23	A	B	C	D	E	43	A	B	C	D	E
4	A	B	C	D	E	24	A	B	C	D	E	44	A	B	C	D	E
5	A	B	C	D	E	25	A	B	C	D	E	45	A	B	C	D	E
6	A	B	C	D	E	26	A	B	C	D	E	46	A	B	C	D	E
7	A	B	C	D	E	27	A	B	C	D	E	47	A	B	C	D	E
8	A	B	C	D	E	28	A	B	C	D	E	48	A	B	C	D	E
9	A	B	C	D	E	29	A	B	C	D	E	49	A	B	C	D	E
10	A	B	C	D	E	30	A	B	C	D	E	50	A	B	C	D	E
11	A	B	C	D	E	31	A	B	C	D	E	51	A	B	C	D	E
12	A	B	C	D	E	32	A	B	C	D	E	52	A	B	C	D	E
13	A	B	C	D	E	33	A	B	C	D	E	53	A	B	C	D	E
14	A	B	C	D	E	34	A	B	C	D	E	54	A	B	C	D	E
15	A	B	C	D	E	35	A	B	C	D	E	55	A	B	C	D	E
16	A	B	C	D	E	36	A	B	C	D	E	56	A	B	C	D	E
17	A	B	C	D	E	37	A	B	C	D	E	57	A	B	C	D	E
18	A	B	C	D	E	38	A	B	C	D	E	58	A	B	C	D	E
19	A	B	C	D	E	39	A	B	C	D	E	59	A	B	C	D	E
20	A	B	C	D	E	40	A	B	C	D	E	60	A	B	C	D	E

GENETICS AND PLANT BREEDING

PART – B

(Descriptive Type)

Answer **any eight** questions. **(8 × 5 = 40 Marks)**

1. Differentiate between collenchyma cells and sclerenchyma cells based on structure and function.

2. You have recorded data on the height of certain plants living on the roadside. Briefly explain the measures of central tendency that can be used in analysing your data.

3. Many bacteriophages not immediately kill the cells they infect, instead integrate their nucleic acid into the genome of the infected host cell. Among the bacteriophages that do this is the lambda phage of *Escherichia coil*. What is the name of this type of reproduction? Briefly explain the events.

4. What is an alternation of generation? Briefly explain by taking an example of bryophyte (a moss life cycle).

5. Few of your juniors in your college are confused to differentiate monocotyledons from dicotyledons. How can you help them?

6. Human activities can affect the carbon cycle. What is your opinion? How?

7. Most of the characteristics that distinguish land plants from green algae are evolutionary adaptations to life on land. Enumerate.

8. During the regional level of assessment carried out in Kerala. The Zoological Survey of India has found that 214 species are facing the threat of extinction. What may be the reason? Suggest some possible causes.

9. Eukaryotic cells contain nearly 2 m of DNA, yet must pack it all into a nucleus no more than 20 mm in diameter. How?

10. Cellular respiration is the process by which cells acquire energy by breaking down nutrient molecules produced by photosynthesis. One of the phases (first) is anaerobic and occurs universally in all organisms i.e. in prokaryotes and eukaryotes. Which is that pathway. Briefly explain the pathway.

11. Normal growth and maintenance of body tissues depend on a balance between signals that promote and inhibit cell division. When this balance is upset, conditions such as cancer may occur. Thus, cancer is usually caused by mutations affecting genes that directly or indirectly affect this balance. Explain.

12. You are required as a senior scientist in plant breeding division of ICAR. Your first assignment is to set an outline of breeding objective of a cultivar development programme. What will be your objectives for this breeding programme?

———————