Code No.	L – 4027

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2021

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. Hydrophobic aliphatic amino acids are

   a) Phe, Tyr b) Ile, Met

   c) Phe, Ile d) Met, Asp

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2. In an alpha helix the carbonyl oxygen of one peptide bond is hydrogen bonded to the amino group of the ———— amino acid.

   a) Second
   b) Third
   c) Fourth
   d) Fifth

3. Isoelectric focussing can be combined with SDS-PAGE to obtain a very resolution separation of proteins and this technique is known as

   a) Two-dimensional gel electrophoresis
   b) Vertical electrophoresis
   c) Horizontal electrophoresis
   d) IEF-PAGE technique

4. Non-protein organic part of the enzyme is called

a) Coenzyme
b) Cofactor
c) Prosthetic group
d) Isoenzyme

5. The committed step in glycolysis is mediated by the enzyme

a) Pyruvate kinase
b) Hexokinase
c) Glucokinase
d) Phosphofructokianse

6. Lipid molecules will spontaneously assemble in aqueous solution to form micelle in which

a) Hydrophobic fatty acid chains are outside and hydrophilic head groups are inside
b) Hydrophobic fatty acid chains are inside and hydrophilic head groups are outside
c) Hydrophilic fatty acid chains are outside and hydrophobic head groups are inside
d) Hydrophilic fatty acid chains are inside and hydrophobic head groups are outside

7. The primed number in a polynucleotide chain indicates

a) The free phosphate group or hydroxyl group
b) The polarity of the nucleotide chain
c) The atom of the sugar to which the phosphate is bonded
d) That both ends are free

8. The length of DNA wrapped inside the nucleosome core particle is

a) 155 bp
b) 200 bp
c) 146 bp
d) 160 bp

9. DNA polymerase I corrects mistakes in DNA by removing mismatched nucleotides. This ability is due to its

a) 3’-5’ exonuclease activity
b) 5’-3’polymerase activity
c) 5’-3’exonuclease activity
d) 3’-5’ endonuclease activity

10. What is the role of the enzyme peptidyl transferase during translation
    a) Binding of ribosomes to mRNA
    b) Activation of amino acids
    c) Transfer of peptide group after its formation from the ribosome site
    d) Peptide bond formation between adjacent amino acids

11. The lac operon is
    a) Under positive control only
    b) Normally expressed constitutively
    c) Under negative and positive control
    d) Under negative control only

12. The rRNAs present in 80S ribosome are
    a) 28S, 18S, 5.8S and 5S
    b) 28S, 23S, 16S and 5S
    c) 23S, 16S, 5.8S and 5S
    d) 23S, 16S and 5S

13. The degenerate nature of genetic code means
    a) The code's non-overlapping
    b) A single amino acid is coded by more than one codon
    c) The third base of codon provides redundancy
    d) It is non-ambiguous

14. The DNA molecule to which gene of interest is inserted for cloning experiments is called
    a) Recombinant molecule
    b) Carrier
    c) Chimera
    d) Vector

15. EMBL stands for
    a) European Molecular Biology Laboratory
    b) European Molecular Biotechnology Laboratory
    c) Eukaryotic Molecular Biotechnology Laboratory
    d) European Modern Biotechnology Laboratory

16. Which of the following is a multiple sequence alignment tool
    a) Phylip
    b) Clustal W
    c) Modeller
    d) Multiseq

17. The complete oxidation of one molecule of glucose during respiration yields
    a) 20 ATP
    b) 36 ATP
    c) 30 ATP
    d) 48 ATP

18. Which of the following is incorrect?
    a) Glucose and galactose are C4 epimers
    b) Glucose and mannose are C2 epimers
    c) Glucose and allose are C3 epimers
    d) Glucose and galactose are C2 epimers

19. Galactosemia is a genetic disease caused by an inability to convert galactose to glucose. It is due to
    a) The deficiency of galactokinase enzyme
    b) Blockage of epimerization of galactose to glucose
    c) The deficiency of galactose 1-phosphate uridylyl transferase enzyme
    d) Overproduction of galactose in the body

20. Which of the following is correct?
    a) Shorter and saturated fatty acids have lower melting point
    b) Shorter and unsaturated fatty acids have lower melting point
    c) Longer and saturated fatty acids have lower melting point
    d) Longer and unsaturated fatty acids have lower melting point

21. The major free energy sources for anabolic pathways are
    a) ATP and NADPH
    b) AMP and NADPH
    c) ATP and NADH
    d) ADP and $NADP^+$

22. Plants can convert fatty acids into glucose through
    a) Glyoxylate pathway
    b) HMP shunt
    c) Fatty acid breakdown
    d) Gluconeogenesis

23. DPD may be defined as the amount by which diffusion pressure of
    a) A solvent is higher than that of its solution
    b) A solvent is lower than that of its solution
    c) A solution higher than that of its solvent
    d) A solution lower than that of its solvent

24. Which one of the statement is incorrect with Km of enzyme?

a) Km is known as Michaelis constant

b) Km refers to the turnover number of enzyme

c) Km is the concentration of substrates when the reaction reaches half of Vmax

d) Small Km indicates high affinity

25. Hormone involved in ripening is

a) Ethylene b) Cytokinin

c) Gibberellin d) Auxin

26. Which one is a symbiotic nitrogen fixing bacteria

a) Clostridium b) Azotobacter

c) Pseudomonas d) Rhizobium

27. The molecule has with importance in both carbohydrate and fatty acid metabolism is

a) Pyruvate b) Acetyl CoA

c) Citric acid d) Glucose

28. Phenyl mercuric acid treatment results in

a) Reduced respiration b) Reduced photosynthesis

c) Reduced transpiration d) Increased water absorption

29. In C4 plants, Calvin cycle operates in

a) Stroma of bundle sheath chloroplasts

b) Stronla of rnesophyll chloroplasts

c) Grana of mesophyll chloroplasts

d) Grana of bundle sheath chloroplasts

30. The order in which electron acceptors are arranged in ETC is

a) Cyt. a, a_3, b, c_1 b) Cyt. b, c_1. a, a_3

c) Cyt. b, c_1, a_3, a d) Cyt. a, b, c_1, a_3

31. In beetle, smooth body (D) is dominant to dumpy (d). and gray appendage (G) s dominant to white (g). A DdGg beetle is mated to ddgg beetle and produced the following offspring: Estimate the distance between the two loci.

Phenotype	Number of Offspring
Smooth, gray	345
Dumpy, white	355
Smooth, white	148
Dumpy, gray	152

a) 30 cM
b) 15.2 cM
c) 14.8 cM
d) 35.5 cM

32. A woman with type A blood group is married to a man with AB blood group. what may be the possible genotypes of their children?
a) A and B
b) A,B and AB
c) A and AB
d) A, AB and O

33. Genes X, Y, Z, and R are located on the same chromosome. The distances between the genes are as follows: The order of genes is

Relationship	Map Unit Distance
R-X	12
R-Y	7
R-Z	24
Y-z	17
X-Y	5

a) XYZR
b) ZYXR
c) ZXYR
d) XRZY

34. The gene specifying coat colour in rabbit comes in four common alleles: C^{ch} (black), c^{h} (chinchilla), c^{h} (Himalayan), and c (albino), when c^{ch} c^{h} rabbit is bred with C c^{h} one, what may be the phenotypic ratio of offspring.
a) 2 black : 1 chinchilla 1 himalayan
b) 1 black : 2 chinchilla: 1 himalayan
c) 2 black : 2 chinchilla
d) 2 black : 2 himalayan

35. Sclerenchymatous bundle sheath is present in
a) Mango
b) Grass
c) Vernonia
d) Ficus

36. The development of a diploid cell in the embryo sac of flowering plants into an embryo without being fertilized is called
a) Parthenogenesis
b) Apogamy
c) Apospory
d) Parthenocarpy

37. Standard deviation is a
    a) Relative measure
    b) Absolute measure
    c) Both a) and b)
    d) None of these

38. Which of the following describes the correct path of light in a compound light microscope, from the illumination source to the eye of the observer?
    a) Condenser lenses → prism →specimen →objective lenses → body tube ocular lens →eye
    b) Ocular lens → body tube → condenser lens → specimen → objective lens → prism → eye
    c) Objective lenses → specimen → condenser lenses →body tube → prism ocular lens → eye
    d) Condenser lenses → specimen → objective lenses → body tube → prism → ocular lens → eye

39. Which of the following is good for protein staining?
    a) Acetocarmine
    b) DAPI
    c) Coomassie Blue
    d) Ethidium bromide

40. Infectious circular single stranded RNA without protein coating is known as
    a) viroid
    b) virion
    c) virusoid
    d) Prion

41. Cephaleoures is a
    a) Epiphytic green algae
    b) Parasitic green algae
    c) Colourless green algae
    d) Nitrogen-fixing green algae

42. Agar is a phycocolloid commonly obtained from the cell walls of the following algae
    a) Sargassam
    b) Volvox
    c) Pinnularia
    d) Gracillaria

43. Aflatoxin is produced by
    a) Virus
    b) Nematode
    c) Fungus
    d) Bacteria

44. Fungi producing eight spores in a sac like structure are
    a) Ascomycetes
    b) Deuteromycetes
    c) Basidiomycetes
    d) Myxomycetes

45. Cord moss is the common name of
    a) Riccia
    b) Funaria
    c) Marchantia
    d) Sphagnum

46. Gametophyte of Pteridophytes is commonly known as
    a) Ligule
    b) Indusium
    c) Prothallus
    d) Thallus

47. The starch obtained from the stem of cycas is known as
    a) Cycas starch
    b) Sago
    c) Floridean starch
    d) Inulin

48. Winged pollen grains are found in
    a) Pinus
    b) Gnetum
    c) Dryopteris
    d) Selaginella

49. An inflorescence in which the flowers are arranged in a seeming whorl, consisting in fact of a pair of opposite axillary, usually sessile, cymes
    a) Spike
    b) Polychasial cyme
    c) Cyathium
    d) Verticillaster

50. Match the following

Fruit	Furit type
a) Apple	i) Legume
b) Orange	ii) Hesperidium
c) Mango	iii) Pome
d) Pea	iv) Drupe

    a) a-ii, b-iv, c-iii, d-i
    b) a-iv, b-ii, c-i, d-iii
    c) a-iii, b-ii, c-iv, d-i
    d) a-iii, b-iv, c-ii, d-i

51. Reserpine is an adrenergic blocking agent used to treat mild to moderate hypertension is obtained from
    a) *Brassica oleraceae*
    b) *Rauwolfia serpentina*
    c) *Atropa belladana*
    d) *Digitalis purpurea*

52. Much among the following is an r-selected species?
    a) Bacteria
    b) Elephant
    c) Sequoia tree
    d) Tortoise

53. The green house effect is mainly due to
    a) Absorption and re-emission of visible light by the atmosphere
    b) Absorption and re-emission of ultra violet light by the atmosphere
    c) Absorption and re-emission of infrared radiation by the atmosphere
    d) All of the above

54. The main objective of 'Chipko andolan' initiated by Sundarlal Bahuguna was
    a) Plant more number of trees
    b) Reduce the planting distance
    c) Protect the environment from pollution
    d) Protect the trees of the forest

55. The order of arrangement of categories in Red Data Book is
    a) Extinct, Extinct in wild, Critically endangered, Endangered, Vulnerable Near threatened, Least concern, Data deficient
    b) Extinct, Extinct in wild, Critically endangered, Vulnerable, Endangered, Near threatened Least concern, Data deficient
    c) Extinct, Extinct in wild, Endangered, Critically endangered, Vulnerable, Near threatened, Least concern, Data deficient
    d) Extinct, Extinct in wild, Vulnerable, Critically endangered, Endangered, Near threatened, Least concern, Data deficient

56. The interchange of parts between non-homologous chromosomes is called
    a) Duplication
    b) Inversion
    c) Translocation
    d) Non-disjunction

57. The term heterosis refers to
    a) Favourable mutation in the somaclones
    b) Superiority of hybrids over their parents
    c) Aggregation of two or more traits in the hybrid
    d) Introduction of mutation in hybrids

58. Two types of errors associated with hypothesis testing are Type I and Type II. Type II error us committed when
    a) We reject the null hypothesis whilst the alternative hypothesis is true
    b) We reject a null hypothesis when it is true
    c) We accept a null hypothesis when it is not true
    d) None of these

59. The method suitable for combining the desirable characters of two plants is known as
    a) Budding
    b) Cutting
    c) Grafting
    d) All of these

60. Expand INFLIBNET
    a) Internet for library network
    b) Information and library network
    c) Indian full time library network
    d) Information library network techniques

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. Explain the major components involved in the preparation of a project report.
2. Discuss the procedure of plant introduction and mention important Indian agencies involved in it.
3. Diagrammatically represent central dogma in molecular biology and explain the modern concept of gene.
4. Write down the structure of starch and cellulose.
5. A gene called “forked” (f) produces shortened, bend or split bristles and hairs in Drosophila. Another gene called ‘outstretched” (os) results in wings being carried at right angles to the body. A third gene called “garnet” (g) produces pinkish eye in young flies. Wild-type female heterozygous at all three loci were crossed to wild-type male. The FI data appear below.

Females	All	Wild type
	57	Garnet outstretched
	419	Garnet forked
	60	Forked
Males	1	Outstretched forked
	2	Garnet
	439	Outstretched
	13	Wild type
	9	Outstretched garnet forked

Which gene is in the middle and what was the linkage relationship between alleles in the female parent. Calculate the map distance?

6. How glycolysis is regulated?
7. Explain non-cyclic photophosphorylation giving emphasis to the photolysis of water
8. Diagrammatically represent the different stages of Meiosis-I.
9. Explain the various numerical aberrations of chromosomes. Mention any two human genetic disorders associated with numerical aberration.
10. What are ecological pyramids? Briefly mention important ones.
11. Illustrate alternation of generation in Riccia.
12. Explain the different types of embryosac.

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