(BOTANY)

1. Function of β-mercaptoethanol in SDS-PAGE _____
(A) To give negative charges to amino acids in proteins
(B) For the oxidation of disulphide bonds in the proteins
(C) The reduction of disulphide bonds in the proteins
(D) For breaking hydrogen bonds in the proteins

2. The variation in the restriction DNA fragment lengths between individuals of a species is called:
(A) Restriction fragment length polymorphism (RFLP)
(B) Random amplified Polymorphic DNA (RAPD)
(C) Amplified fragment length polymorphism (AFLP)
(D) Simple sequence repeats (SSR)

3. A researcher is said to be committed the Type 1 error when_____
(A) When he rejects a null hypothesis which is actually true
(B) When he accepts a null hypothesis which is actually false
(C) Both the null and alternate hypothesis is rejected
(D) Both the null and alternate hypothesis is accepted

4. Retardation factor (RF) is the ratio of _____
(A) Distance moved by substance from base line to the distance moved by the solvent from base line
(B) Distance moved by solvent from base line to distance moved by the substance from baseline
(C) Distance moved by substance from top line to distance moved by the solvent from top line
(D) Distance moved by solvent from top line to distance moved by the substance from top line

5. Photosynthetic pigments are separated by using paper chromatography; the order of pigments on chromatogram is as follows:
(A) Chl.b, Chl.a, Xanthophyll, Carotenes (B) Chl.a, Chl.b, Xanthophyll, Carotenes
(C) Chl.a, Chl.b, Carotenes, Xanthophyll (D) Carotenes, Chl.a, Chl.b, Xanthophyll

6. Acid-fast staining is a differential stain used to identify acid-fast organisms (genus Mycobacterium). The procedure of acid-fast staining includes heating of bacteria and mixing basic fuchsin phenol. Once basic fuchsinpenetrates the cell wall, acid-fast cells are not easily decolorized by an acid alcohol treatment and hence remain red this is because of which component:-
(A) Dipicolinic acid (B) Teichoic acid
(C) Peptidoglycans (murein) (D) Mycolic acid

7. Lactose permease formed a channel during processing for transport of lactose from outside to inside cell, it is an example of
(A) Co-transporter (B) Uniporter
(C) Antiporter (D) Active transport

8. A scientist is performing is an experiment of synthesis of very-long-chain fatty acid. But unable to get the same result, the reason behind this
(A) Problem in lysosome (B) Problem in Peroxisome
(C) Problem in Golgi apparatus (D) Problem in ER

9. The interaction of CDK-2 & Cyclin A helps in
(A) Passaging of cell into S phase (B) Passaging of the cell into G_1 phase
(C) Passaging of the cell into G_2 phase (D) Transition of cell into G_2 -M phase

10. Separation of charged molecules is based on varying rates of migration through a solid matrix when subjected to an electric field?
(A) Photoreactivation (B) Gel electrophoresis
(C) Autoradiography (D) Eastern blotting

11. What are the techniques used to transfer protein onto nitrocellulose paper?
(A) Electrophoresis (B) Southern blotting
(C) Northern blotting (D Western blotting

12. Optical density of 1 means
(A) 1% of the incident light is absorbed (B) 0% of the incident light is transmitted
(C) 10% of the incident light is transmitted (D) 90% of the incident light is transmitted

13. A Competitive inhibitor:
(A) Increases the Km of an enzyme
(B) Decreases the Km of an enzyme
(C) Increases both the Vmax and Km of an enzyme
(D) Decreases the Km but increases the Vmax of an enzyme

14. Which of the following types of chromatography involves the process, where the mobile phase moves through the stationary phase by the influence of gravity or capillary action?
(A) Column Chromatography (B) High Pressure Liquid Chromatography
(C) Gas Chromatography (D) Planar Chromatography

15. Cellular respiration/ cellular viability of seeds and pollen grains can be analysed by using which of the following dye:
(A) TTC (triphenyltetrazolium chloride) (B) Aniline blue
(C) Crystal violet (D) Saffranin

16. Transmission Electron Microscopy (TEM) is most often used to reveal _____.
(A) surface structures
(B) internal structures
(C) both surface and internal structures simultaneously
(D) either surface or internal structures, but not simultaneously

17. Which of the following pair of molecular markers is co-dominant?
(A) AFLP and RAPD (B) RFLP and SSR
(C) RAPD and SSR (D) RAPD and RFLP

18. Southern blotting, Northern blotting and Western blotting, mainly separates_____,____ and _____ respectively.

(A) DNA, Proteins and RNA
(B) DNA, RNA and Proteins
(C) RNA, DNA and Proteins
(D) Proteins, RNA and DNA

19. Some floral characters and their taxonomic status are shown below

Floral characters		Taxonomic status	
1.	Basal Placentation	(a)	Primitive
2.	Superior Ovary	(b)	Primitive
3.	Stamens many	(c)	Advanced
4.	Gamopetalous condition	(d)	Advanced

Choose the combination with all correct matches

(A) 1-(a), 2-(c), 3-(b), 4-(d)
(B) 1-(b), 2-(d), 3-(c), 4-(a)
(C) 1-(c), 2-(a), 3-(b), 4-(d)
(D) 1-(d), 2-(c), 3-(a), 4-(b)

20. Four groups of students gather following data in order to study species diversity at 4 different locations of a site using quadrat method. Different locations here represent 4 plant communities.

Species	Community (species abundance)			
	C1	C2	C3	C4
Sp1	70	0	25	60
Sp2	30	0	220	50
Sp3	0	185	0	0
Sp4	20	30	30	45
Sp5	65	0	0	70
Sp6	95	0	0	45

Based on the observations, following conclusions were drawn:

(a) Community C_1 and C_4 show strong similarity
(b) Community C_1 is least diverse
(c) Community C_4 is most diverse
(d) Community C_2 and C_3 show strong similarity

Which of the following statements is correct regarding conclusions?

(A) All are correct
(B) Only (a) and (c) are correct
(C) Only (a),(b) and (c) are correct
(D) Only (b) and (d) are correct

21. DPX, a colourless synthetic mounting media used for histology

(A) Is a resin-based slide mountant with xylene solvent
(B) Dries quickly and preserves stains
(C) Both A and B
(D) DPX is expensive mountant than Canada balsam

22. Tick mark the INCORRECT statement regarding sterilization techniques employed in plant tissue culture:
(A) In Laminar Flow cabinet, air is passed through HEPA filter which removes all airborne contamination
(B) Autoclave is a type of dry heat sterilization method used to remove microorganisms
(C) Autoclaving is generally done at 15 Psi pressure, 121ºC temperature for 15-20 minutes
(D) Centrifugation is a process where a mixture is separated through spinning and operates on the basis of sedimentation

23. Cell A has osmotic potential of -20 bars and pressure potential of 8 bars, whereas, cell B has osmotic potential of -16 bars and pressure potential 2 bars. The direction of flow of water will be:
(A) From cell B to cell A
(B) From cell A to cell B
(C) No flow of water
(D) In both directions

24. Glycerol is added to protein samples before they are loaded to the wells of PAGE. The function of glycerol is to_____
(A) Stabilize protein structure
(B) Maintain pH of the sample
(C) Helps to bind SDS to the protein
(D) Helps to reduce disulphide bonds by β-mercaptoethanol

25. Which one of the following chemicals is a DNA intercalator?
(A) 5-Bromouracil
(B) Ethyl methane sulfonate
(C) Acridine orange
(D) UV

26. In terpenes biosynthesis pathway, 3 acetyl-CoA are joined together stepwise to form mevalonic acid. Which one of the following three steps is required by mevalonic acid to form isopentenyldiphosphate or isopentenyl pyrophosphate (IPP)?
(A) Pyrophosphorylation, Decarboxylation and Dehydration
(B) Alkylation, Pyrophosphorylation and Decarboxylation
(C) Methylation, Dehydration and Alkylation
(D) Phosphorylation, Carboxylation and Methylation

27. Calyptra develops from?
(A) Venter wall of the archegonium
(B) Neck of the archegonium
(C) Outgrowth of the gametophyte
(D) Outgrowth of sporophyte

28. Which part of capsule produces sporogenous cells in *Marchantia* ?
(A) Endothecium
(B) Outer amphithecium
(C) Inner amphithecium
(D) Seta

29. In which bryophyte the sporophyte is partially independent with unlimited growth?
(A) *Anthoceros*
(B) *Sphagnum*
(C) *Porella*
(D) *Marchantia*

30. In Sphagnum, the gametophyte structure compensating for the absence of seta is known as?
(A) Columella
(B) Sporangiophore
(C) Pseudopodium
(D) Elaterophore

31. Eusporangiate mode of sporangium development is found in?
(A) *Funaria* (B) *Marchantia*
(C) *Rhynia* (D) *Lycopodium*

32. Which one of the following features is not correct about 'horse tail' plant strobilus?
(A) Peltate sporangia (B) Heterosporous
(C) Presence of elaters (D) Homosporous

33. In Raunkiaer's life form, tuberous plants are kept in?
(A) Thermophytes (B) Chamaephytes
(C) Phanerophytes (D) Cryptophytes

34. The facilitation model of succession characterizes the following?
(A) Inhibition view (B) Monoclimax view
(C) Polyclimax view (D) Maturation of communities

35. Rhizobial genes that participate in legume nodule formation are called nodulation (nod) genes. The nod-encoded protein
(A) An acetyl transferase that adds a fatty acyl chain to the Nod factor
(B) Binds to the nod box and induces transcription of all nod genes
(C) Catalyzes the linkage of N-acetyl glucosamine residues
(D) Influences the host specificity of Rhizobium

36. DCMU herbicide inhibits photosynthesis at photosystem during:
(A) Phe → QA (B) QA → QB
(C) Cyt-bf6 → PC (D) QB → Cytbf6

37. Plants dissipate excess excitation energy as heat so as to protect from photo oxidative damage. The mechanism is known as
(A) Photo chemical quenching (B) Non Photochemical quenching
(C) Photo-inhibition (D) Warburg effect

38. α-Amanitin is a fungal toxin which inhibits eukaryotic RNA polymerases. The eukaryotic RNA polymerases show differential sensitivity to this toxin. Which of the following order is correct:
(A) RNA POL III> RNA POL II>RNA POL I
(B) RNA POL II> RNA POL III> RNA POL I
(C) RNA POL I> RNA POL III>RNA POL II
(D) RNA POL II> RNA POL I>RNA POL III

39. Which of the algae is responsible for red colour of red sea?
(A) *Chlamydomonas braunii* (B) *Trichodesmium erythrium*
(C) *Ulothrix zonata* (D) *Cephaleuros*

40. Carpogonia is the female sex organ in which of the algae?
(A) Rhodophycophyta (B) Xanthophycophyta
(C) Chrysophycophyta (D) Chlorophycophyta

41. Two lateral flagella are present in which of following groups of algae?
(A) Rhodophycophyta (B) Xanthophycophyta
(C) Phaeophycophyta (D) Bacillariophycophyta

42. Which fungi cause black wart disease of potato?
(A) *Saprolegnia parasitica* (B) *Synchytrium endobioticum*
(C) *Rhizopus stolonifer* (D) *Saccharomyces cerevisiae*

43. Bunt of rice is caused by which of the following fungus?
(A) *Tilletia barclayana* (B) *Helminthosporium oryzae*
(C) *Pyricularia oryzae* (D) *Saccharomyces cerevisiae*

44. In cellular respiration, which of the following processes occur only inside mitochondria and not in the cytoplasm?
(A) Glycolysis and pentose – phosphate pathway
(B) Glycolysis and Citric acid cycle
(C) Citric acid cycle and oxidative phosphorylation
(D) Glycolysis and oxidative phosphorylation

45. What kind of aneuploidy gametes will be generated if meiotic non disjunction occurs at first division? ("n" represents the haploid number of chromosomes)
(A) Only n+1 and n (B) Only n-1 and n
(C) Both n+1 and n-1 (D) Either n+1 or n-1

46. APG IV gives an update on classification of angiosperms at the level of:
(A) Species and genera (B) Genera and families
(C) Families and Orders (D) Orders and classes

47. Which of the following medicinal plant is used for treatment of hypertension?
(A) *Aconitum* (B) *Digitalis*
(C) *Rauwolfia serpentine* (D) *Adhatoda*

48. The development of a diploid gametophyte from sporophytes without gamete formation is called:
(A) Apospory (B) Parthenogenesis
(C) Apogamy (D) Hyperplasia

49. Tetrasporicsporic type of embryo sac development found in;
(A) *Polygonum* (B) *Allium*
(C) *Oenothera* (D) *Fritillaria*

50. Diploxylic vascular bundle is found in;
(A) *Cycas* leaves (B) *Cycas* roots
(C) *Pinus* needle (D) *Gnetum* leaves

x-x-x

Panjab University, Chandigarh
M.Phil./PHD - 2022
ANSWERS / KEY

Subject: Botany(Ph.D.)

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

Note: An 'X' (if any) in the key indicates that either the question is ambiguous or it has printing mistake. All candidates will be given credit for this question