DAY EIGHTEEN

Unit Test 4
(Plant Physiology)

1 Which of the following is an example of osmosis?
(a) Flow of water out of a cell
(b) Pumping of solutes into a cell
(c) Flow of water between cells
(d) Both (a) and (c)

2 Organic molecules make up what percentage of the dry weight of a plant?
(a) 17% (b) 6% (c) 67% (d) 96%

3 Non-cyclic photophosphorylation during photosynthesis
(a) generates ATP (b) produces NADPH
(c) Both (a) and (b) (d) produces NAD

4 The enzymes of EMP are located in
(a) cytosol (b) cytosol and mitochondria
(c) lysosomes (d) ribosomes

5 Vernalisation takes place in response to
(a) low light intensity (b) high light intensity
(c) low temperature (d) high temperature

6 The amount and direction of movement of water in plants can always be predicted by measuring
(a) dissolved solutes (b) proton gradients
(c) rainfall (d) water potential (ψ_w)

7 Which of the following mineral elements plays an important role in biological nitrogen-fixation?
(a) Cu (b) Mn (c) Zn (d) Mo

8 The end result of the cyclic electron pathway, from PS-I to PS-II during photophosphorylation is
(a) evolution of O_2 (b) evolution of H^+
(c) production of ATP (d) production of e^-

9 The emitted electrons during photolysis of water are accepted by
(a) phycobilins
(b) carotene
(c) xanthophyll
(d) chlorophyll (oxidised P_{680} of PS-II)

10 Which of the following statements are true/false?
I. The positive hydrostatic pressure is called turgor pressure.
II. Wall pressure prevents the increase of protoplasm size.
III. Diffusion is more rapid in liquids than in gases.
IV. Diffusion of water through a semipermeable membrane is called imbibition.
V. Osmosis is the movement of substances, which takes place along a diffusion gradient.
(a) I and II are true, while III, IV and V are false
(b) I and III are true, while II, IV and V are false
(c) I and IV are true, while II, III and V are false
(d) I and IV are false, while II, III and IV are true

11 Match the following columns.

	Column I		Column II
A.	Mineral required for synthesis of chlorophyll	1.	Fe
B.	Mineral required for ATP synthesis	2.	Cu
		3.	Mg
		4.	P

Codes

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

12 In a germinating seed, when protein is aerobically oxidised, the RQ value will be
(a) less than one (b) more than one
(c) zero (d) one

13 Match the following columns.

	Column I		Column II
A.	Shoot apices	1.	Cytokinin
B.	*Gibberella fujikuroi*	2.	Auxin
C.	Coconut milk	3.	Ethylene
D.	Ripening fruit	4.	ABA
E.	Aged leaves of plants	5.	GA

Codes

	A	B	C	D	E
(a)	2	3	4	5	1
(c)	1	2	3	4	5

	A	B	C	D	E
(b)	2	5	1	3	4
(d)	5	4	3	2	1

14 The last end product of glycolysis is
(a) acetyl Co-A (b) pyruvic acid
(c) phosphoglyceraldehyde (d) fructose

15 The most common auxin is
(a) GA (b) ABA
(c) kinetin (d) IAA

16 Which of the following is true concerning the water potential of a plant cell?
(a) It is equal to zero when the cell is in pure water and is turgid
(b) It becomes lower after the uptake of water by osmosis
(c) It becomes higher when K^+ ions are actively moved into the cell
(d) It is equal to 0.23 MPa

17 Which of the following proteins is found in the coralloid roots inhabited by *Rhizobium*?
(a) Leghaemoglobin (b) Plastocyanin
(c) Nitrate reductase (d) Hydrogenase

18 Select the correct statement.
(a) The photosystem of chlorophyll absorbs solar energy
(b) Photosystem is the reaction centre of chlorophyll
(c) Photosystem energises electrons
(d) Photosystem funnels electrons to electron acceptor molecule

19 Which enzyme is not present in electron transport system?
(a) NADH dehydrogenase
(b) Cytochrome-*c* oxidase
(c) FeS proteases
(d) Glucose 6- phosphate dehydrogenase

20 ABA acts antagonistic to
(a) ethylene (b) cytokinin
(c) gibberellic acid (d) IAA

21 Your laboratory partner has an open beaker of pure water. By definition, the water potential (ψ_w) of this water is
(a) not meaningful, because it is an open beaker and not plant tissue
(b) a positive number set by the volume of the beaker
(c) zero
(d) a negative number set by the volume of the beaker

22 In which one of the following, nitrogen is not a constituent?
(a) Idioblast (b) Bacteriochlorophyll
(c) Invertase (d) Pepsin

23 Photo-oxidation of water resulting in the release of molecular oxygen is due to
(a) PS-I (b) PS-II
(c) Both (a) and (b) (d) Phycobilins

24 Floating respiration occurs when respiratory substrates are
(a) fats and carbohydrate (b) proteins
(c) organic acids (d) Both (a) and (b)

25 Each meristem influences other meristems. The phenomenon is
(a) allometry (b) growth correction
(c) lag phase (d) auxetic growth

26 The main mechanism determining the direction of short-distance transport within a potato tuber is
(a) determined by the structure and function of the tonoplast of the tuber cells
(b) diffusion due to concentration differences and bulk flow due to pressure differences
(c) not affected by temperature and pressure
(d) pressure flow through the phloem

27 The major portion of the dry weight of plant comprises of
(a) nitrogen, phosphorus and potassium
(b) calcium, magnesium and sulphur
(c) carbon, nitrogen and hydrogen
(d) carbon, hydrogen and oxygen

28 Which of the following statements are correct?
I. Carboxylation of RuBP is catalysed by RuBisCO.
II. The first stable intermediate compound formed is phosphoglycerate.
III. 18 ATP molecules are synthesised during dark cycle.
IV. NADPH + H^+ is used to reduce diphosphoglycerate.

Codes
(a) II, III and IV (b) I, III and IV
(c) I, II and IV (d) I, II and III

29 At the end of citric acid cycle, most of the energy is transferred to
(a) oxaloacetic acid (b) NADH and $FADH_2$
(c) ATP (d) citric acid

30 Types of plants that come to flower after exposure to short photoperiods followed by long photoperiods are
(a) intermediate plants (b) short-long day plants
(c) day-neutral plants (d) long-short day plants

31 Which of the following would have an effect on water potential (ψ_w) in plants?
(a) Water-attracting matrices (b) Air pressure
(c) Dissolved solutes (d) All of these

32 Which of the following is a micronutrient?
(a) Ni (b) S
(c) P (d) Ca

33 What happens, when chlorophyll is exposed to high intensity of light?
(a) Photosynthesis is accelerated
(b) Solarisation and destruction of chlorphyll occur
(c) O_2 evolution increases
(d) CO_2 fixation is inhibited

34 Rate of respiration is inversely proportional to
(a) dehydration (b) tissue injury
(c) minerals (d) temperature

35 A long-day plant flowers only when it is exposed to
(a) red light
(b) light more than critical day length
(c) light equal to critical day length
(d) light less than critical day length

36 Compared to a cell with few aquaporin in its membrane, a cell containing many aquaporins will
(a) have a faster rate of osmosis
(b) be less turgid
(c) have a faster rate of active transport
(d) have a lower water potential

37 Which is essential for root hair growth?
(a) Zn (b) Ca (c) Mo (d) S

38 Photorespiration does not occur in which of the following?
(a) Wheat (b) Rice
(c) Cereals (d) Sugarcane

39 Carotenes protect plants from
(a) photooxidation (b) dessication
(c) photorespiration (d) photosynthesis

40 Genetically dwarf plants can be induced to grow tall by using
(a) gibberellins (b) phycobilins
(c) auxins (d) cytokinins

41 All of the following statements about xylem are correct except
(a) xylem conduction occurs within dead cells
(b) xylem has a lower water potential
(c) xylem conducts material upward
(d) xylem transports mainly sugars and amino acids

42 Which of the following is non-essential element in plant nutrition?
(a) Na (b) Mg (c) Ca (d) Fe

43 Match the following columns.

	Column I		Column II
A.	Increase the rate of photosynthesis	1.	Cytokinin
B.	Decrease the rate of photosynthesis	2.	Abscisic acid
		3.	Gibberellin

Codes

	A	B		A	B
(a)	1,2	3	(b)	1,3	2
(c)	3	1,2	(d)	2	1, 3

44 Which among the following statements is incorrect regarding fermentation?
(a) It involves breakdown of pyruvic acid
(b) End product of alcoholic fermentation is ethyl alcohol
(c) It takes place in the presence of oxygen
(d) Its pathway is dependent on the type of organisms and end products

45 Which of the following statements are correct?
I. Kinetin is a degradative substance from DNA.
II. ABA is present in all plants including lower plants.
III. Low ratio of cytokinin to auxin favours root formation only.
IV. ABA is synthesised catabolically through glycolysis pathway.

Codes
(a) I and II (b) II and III (c) I and III (d) III and IV

46 Which of the following describes the fate of most of the water taken up by a plant?
(a) It is used as a hydrogen source in photosynthesis
(b) It is lost during transpiration
(c) It makes cell elongation possible
(d) It is used as a solvent

47 K, N, Ca, Mg deficiency causes
(a) chlorosis (b) leaf curl
(c) red rust of tea (d) red rot of sugarcane

48 Calvin cycle does not include
(a) reduction of NADH
(b) carboxylation
(c) glycolytic renewal
(d) regeneration of RuBP

49 The electron transport chain consists of
(a) NAD (b) FMN
(c) FAD (d) All of these

50 Which of the following is incorrectly matched?
(a) Explant — Excised plant part used for callus formation
(b) Cytokinin — Root initiation in callus
(c) Somatic embryo — Embryo produced from a vegetative cell
(d) Anther culture — Haploid plants

51 The greatest proportion of the water taken up by plants is
(a) stored in the xylem
(b) absorbed by central vacuoles during cell elongation
(c) lost through stomata during transpiration
(d) returned to the soil by roots

52 The last electron acceptor of ETC during oxidative phosphorylation is

(a) cyt-b (b) cyt-a_3
(c) H_2 (d) CO_2

53 If photosynthesising, green algae are provided with CO_2 labelled with an isotope of oxygen (O^{18}), later analysis showed that all of the following compounds produced by the algae contain ^{18}O except

(a) PGA (b) RuBP
(c) glucose (d) O_2

54 The carbon dioxide concentration at which net gaseous exchange is zero, is called

(a) oxygen compensation point
(b) carbon dioxide compensation point
(c) water compensation point
(d) None of the above

55 Phytochrome occurs in two forms. In which form it promotes the germination of seeds of some species?

(a) P_{fr} forms (b) P_r forms
(c) Both (a) and (b) (d) None of these

56 How does water in the xylem travel to the mesophyll in the leaves?

(a) By osmosis due to the osmotic pressure in leaf tissue
(b) By active transport
(c) By a pumping mechanism unique to plants
(d) By a vacuum created within the leaf petioles

57 Match the following columns.

	Column I		Column II
A.	Constituent of organic biomolecules	1.	Mg^{2+}
B.	Component of energy	2.	Zn^{2+}
C.	Activators and inhibitors of enzymes	3.	K^+, Na^+
D.	Regulators of osmotic potential of cell	4.	C, H, O, N

Codes

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

58 Match the following columns.

	Column I		Column II
A.	Oxygenic photosynthesis	1.	Blue-green algae
B.	Anoxygenic photosynthesis	2.	Angiosperm
		3.	Photosynthetic purple sulphur bacteria

Codes

	A	B		A	B
(a)	1,2	3	(b)	3	1,2
(c)	1	2,3	(d)	2,3	1

59 In prokaryotes, NADH + H^+ oxidation takes place in

(a) mitochondria (b) mesosomes
(c) vacuole (d) cytoplasm

60 Phytochrome was isolated by

(a) Butler *et. al* (b) W Went
(c) R Hill (d) Borthwick *et. al*

61 What properties of water enable it to travel up long distances in a plant?

(a) Cohesion
(b) Adhesion
(c) Both (a) and (b)
(d) Ice is less dense than liquid water

62 Choose the correct option regarding the general functions of mineral elements?

(a) They are the structural elements of cells
(b) They are components of energy
(c) They are components that activate or inhibit enzymes
(d) All of the above

63 Select the false statement.

(a) ATP or NADH is not formed during photorespiration
(b) C_4-pathway of photosynthetic CO_2-fixation was first discovered by Hatch and Slack
(c) Photorespiration results in maximum production of ATP
(d) In C_4-plants, Phosphoenol Pyruvate (PEP) acts as CO_2 acceptor

64 Cyanide inhibits the electron flow between

(a) cytochrome-*a* and cytochrome-a_3
(b) F_1-ATPase and F_0-component
(c) NAD and FMN
(d) ubiquinone and cytochrome-*b*

65 Ethylene is used for

(a) retarding ripening of tomatoes
(b) hastening of ripening of apples
(c) fastening of ripening of fruits
(d) Both (b) and (c)

66 Match the following columns.

	Column I (Principle)		Column II (Scientist)
A.	Mass-flow hypothesis	1.	JC Bose
B.	Relay pump theory	2.	Strasburger
C.	Transpiration pull theory	3.	Munch
D.	Pulsatile movement theory	4.	Godlewski
		5.	Dixon and Jolly

Codes

	A	B	C	D		A	B	C	D
(a)	4	3	5	1	(b)	3	4	1	5
(c)	4	3	1	5	(d)	3	4	5	1

67 Which microbe produces nitrogen-fixing nodules on the roots of non-leguminous plants like *Alnus*?

(a) *Frankia* (b) *Rhizobium* (c) *Drosera* (d) *Nepenthes*

68 Select the correct pathway for electron transport during photosynthesis.
(a) $CO_2 \rightarrow RuBP \rightarrow Glucose - ATP$
(b) $H_2O \rightarrow PS-I \rightarrow PS-II \rightarrow NADPH + H^+$
(c) $H_2O \rightarrow PS-II \rightarrow PS-I \rightarrow NADPH + H^+$
(d) $H_2O \rightarrow PS-II \rightarrow PS-I \rightarrow ATP$

69 Pentose Phosphate Pathway (PPP) involves
(a) generation of NADPH
(b) production of ribulose-5-phosphate
(c) production of erythrose-4-phosphate
(d) All of the above

70 Photoperiodism influences
(a) seed germination
(b) vegetative growth
(c) internode elongation
(d) All of the above

71 Transport of organic solutes is supposed to take place by pressure flow hypothesis through phloem tissue from source to sink. Choose the false statement about vascular tissue transport.
(a) Phloem transports mainly water and sucrose but other sugars, hormone and amino acids are also transported
(b) Water enters into the sieve tube by the process of osmosis
(c) Water and solute move through the sieve tube along the pressure gradient
(d) Sieve tube in the source have a low turgor pressure (pressure potential)

72 Donnan equilibrium is associated with
(a) transport of non-diffusible ions
(b) transport of diffusible ions
(c) Both (a) and (b)
(d) None of the above

73 A scientist disrupted the chloroplast and separated the stroma from lamella. For fixing CO_2, he supplied stroma with

I. ATP II. NADPH III. Glucose

Select the correct option.
(a) I and III (b) III and II
(c) I and II (d) I, II and III

74 Wavelength of PAR is
(a) 340-450 nm (b) 400-700 nm
(c) 500-600 nm (d) 450-950 nm

75 I. Indole-3-acetic acid
II. 2-4, dichlorophenoxy acetic acid
III. 6 Indole butyric acid
IV. Naphthalene acetic acid

Above are the examples of which plant growth hormone?
(a) Auxin (b) Cytokinin
(c) Ethylene (d) Gibberellin

76 Translocation is a
(a) catabolic process (b) anabolic process
(c) passive mechanism (d) ATP dependent process

77 Which among the following theories is not involved in active mineral absorption?
(a) Carrier concept theory (b) Ion-exchange theory
(c) Cytochrome-pump theory (d) Protein lecithin theory

78 I. Initial CO_2 acceptor.
II. Extent of photorespiration.
III. Enzyme catalysing reaction that fixes CO_2.
IV. The presence of Calvin cycle.
V. Leaf anatomy.

Which one does not differ in a C_3 and C_4- plants?
(a) I and V (b) Only IV (c) II and III (d) Only II

79 Which one of the following pairs is incorrectly matched?

(a)	Antibiotics	—	Fermentation
(b)	Glycolysis	—	Cytosol
(c)	ETC	—	Shuttles
(d)	Complex II	—	FMN

80 Who first suggested the presence of growth regulatory chemicals in plants?
(a) Went (b) Sachs
(c) Darwin (d) Paal

81 Difference in the hydrostatic pressure between leaf and storage organs promotes
(a) ascent of sap (b) storage of water
(c) translocation (d) photorespiration

82 The mode of nutrition of *Azotobacter* and *Beijerinckia* is
(a) chemoautotrophic (b) saprotrophic
(c) photoautotrophic (d) None of these

83 I. It is the characteristic of C_4-plants
II. It is the characteristic of C_3-plants
III. It occurs in chloroplast.
IV. It occurs in daytime
V. It occurs in night.

Select the correct options in relation to photorespiration.

	Correct option	Incorrect option
(a)	I, IV	II, III, V
(b)	II, III, IV	I,V
(c)	I, II, III	IV, V
(d)	IV, V	I, II, III

84 Which one of the following reactions correctly explains the process of fermentation?
(a) Pyruvic acid → Acetaldehyde → Acetic acid
(b) Glucose → Pyruvate
(c) Succinate → Fumarate
(d) None of the above

85 Match the following columns.

	Column I		Column II
A.	Auxin	1.	Auxins
B.	Abscisic acid	2.	Breaking dormancy
C.	Parthenocarpy	3.	Cell division
D.	Gibberellin	4.	Apical meristem
		5.	Leaves and fruits

Codes

	A	B	C	D
(a)	4	5	1	2
(b)	1	2	5	4
(c)	4	2	1	3
(d)	3	2	4	5

86 Passive absorption of mineral salt is not

(a) osmosis (b) diffusion
(c) Donnan equilibrium (d) ion exchange

87 In reductive amination,

(a) ammonia combines with amino acid glutamate
(b) ammonia combines with a keto acid
(c) transfer of amino groups from an amino to keto group of a keto acid
(d) None of the above

88 Match the following columns.

	Column I		Column II
A.	EMP pathway	1.	*Nitrosomonas*
B.	Amphibolic	2.	Ammonification
C.	Nitrification	3.	*Pseudomonas*
D.	Denitrification	4.	Glycolysis
		5.	Respiratory pathway

Codes

	A	B	C	D
(a)	1	2	3	4
(b)	2	3	4	5
(c)	3	4	5	1
(d)	4	5	1	3

89 Photosynthesis and respiration are similar because

I. in eukaryotes, both processes occur in specialised organelles.
II. ATP synthesis in both is explained by chemiosmotic theory.
III. Both use ETC.

Select the correct option.

(a) I and II (b) II and III
(c) I and III (d) All of these

90 Match the following columns.

	Column I		Column II
A.	*Bryophyllum*	1.	Short-long day plants
B.	Wheat	2.	Leaf apex of *Gloriosa*
C.	Thigmotropism	3.	Peduncles of tulip
D.	Thermotropism	4.	Long-short day plant
		5.	*Equisetum*

Codes

	A	B	C	D
(a)	2	1	5	4
(b)	4	1	2	3
(c)	5	4	2	1
(d)	3	2	4	1

ANSWERS

1 (d)	**2** (d)	**3** (c)	**4** (a)	**5** (c)	**6** (d)	**7** (d)	**8** (c)	**9** (d)	**10** (a)
11 (d)	**12** (a)	**13** (b)	**14** (b)	**15** (d)	**16** (a)	**17** (a)	**18** (a)	**19** (d)	**20** (c)
21 (c)	**22** (a)	**23** (b)	**24** (a)	**25** (b)	**26** (b)	**27** (d)	**28** (c)	**29** (a)	**30** (b)
31 (d)	**32** (a)	**33** (b)	**34** (a)	**35** (b)	**36** (a)	**37** (b)	**38** (d)	**39** (a)	**40** (a)
41 (d)	**42** (a)	**43** (b)	**44** (c)	**45** (c)	**46** (b)	**47** (a)	**48** (c)	**49** (d)	**50** (b)
51 (c)	**52** (b)	**53** (d)	**54** (b)	**55** (a)	**56** (a)	**57** (a)	**58** (a)	**59** (b)	**60** (a)
61 (c)	**62** (d)	**63** (c)	**64** (a)	**65** (b)	**66** (d)	**67** (a)	**68** (c)	**69** (d)	**70** (d)
71 (d)	**72** (a)	**73** (c)	**74** (b)	**75** (a)	**76** (d)	**77** (b)	**78** (b)	**79** (d)	**80** (a)
81 (c)	**82** (b)	**83** (b)	**84** (a)	**85** (a)	**86** (a)	**87** (b)	**88** (d)	**89** (b)	**90** (b)