අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2018 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2018 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2018

09.08.2018 / 1300 – 1500

කෘෂි විද්‍යාව	I
விவசாய விஞ்ஞானம்	I
Agricultural Science	**I**

08 E I

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two hours

Instructions:

- *Answer **all** the questions.*
- *Write your **Index Number** in the space provided in the answer sheet.*
- *Instructions are given on the back of the answer sheet. Follow those carefully.*
- *In each of the questions **1** to **50**, pick one of the alternatives from (1), (2), (3), (4), (5) which is **correct** or **most appropriate** and **mark your response on the answer sheet with a cross** (×) on the number of the correct option in accordance with the instructions given on the back of the answer sheet.*

1. In Sri Lanka, reddish-brown earth is mainly found in
(1) mid country dry zone. (2) low country dry zone.
(3) mid country wet zone. (4) low country wet zone.
(5) mid country intermediate zone.

2. In plant nutrition, Cobalt and Silicon is considered as
(1) micro nutrients. (2) macro nutrients.
(3) movable nutrients. (4) essential nutrients.
(5) beneficial nutrients.

3. The major form/s of nitrogen absorbed into a plant would be
(1) NO_3^- (2) NH_4^+ (3) NO_2^-
(4) NO_3^- and NH_4^+ (5) NO_2^- and NO_3^-

4. Of the following methods of irrigation, the one that conserves the most water is
(1) drip irrigation. (2) basin irrigation. (3) flood irrigation.
(4) furrow irrigation. (5) sprinkler irrigation.

5. Glyphosate is a
(1) contact, selective weedicide. (2) systemic, selective weedicide.
(3) contact, non-selective weedicide. (4) translocative, selective weedicide.
(5) systemic, non-selective weedicide.

6. The most effective method to control fruit fly is
(1) use of light traps.
(2) use of pheromone traps.
(3) spraying of neem extract.
(4) spraying of contact insecticides.
(5) catching of the fruit flies by insect nets.

7. Viral diseases of crop plants can be effectively controlled by
(1) using pheromone traps.
(2) removing infested plants from the field.
(3) spraying sulphur after seeing the symptoms.
(4) spraying contact insecticides after seeing the symptoms.
(5) spraying systemic insecticides after seeing the symptoms.

[*See page two*

8. Pesticides are prepared in different formulations and one such formulation is the Emulsifiable concentrates (EC). In the market, EC is found in the form of
(1) Dusts. (2) Blocks.
(3) Liquids. (4) Granules.
(5) Wettable powders.

9. Parthenium (*Parthenium hysterophorus*) can be best explained as
(1) an alien aquatic plant. (2) an alien invasive plant.
(3) an endemic invasive plant. (4) an endemic medicinal plant.
(5) an underutilized medicinal plant.

10. Damping off disease in nurseries is mainly caused by a
(1) virus. (2) fungus. (3) bacteria. (4) protozoa. (5) nematode.

11. Transpiration helps plant to
(1) keep the plant cool. (2) exchange the gases.
(3) increase photosynthesis. (4) absorb the plant nutrients.
(5) maintain the turgor pressure.

12. The plant growth regulator commonly used in ripening of fruit is
(1) IAA. (2) IBA. (3) GA3. (4) NAA. (5) Ethylene.

13. An example for a C_4 plant is
(1) rice. (2) maize. (3) tomato. (4) soybean. (5) common bean.

14. The pregnancy period of a dairy cow is approximately
(1) 210 days. (2) 280 days. (3) 305 days. (4) 340 days. (5) 360 days.

15. The main site of mechanical digestion of feed in a chicken digestive tract is
(1) beak. (2) crop. (3) proventiculus.
(4) gizzard. (5) large intestine.

16. Breeds of chicken can be categorized into four Classes based on their place of origin. An example for a breed of American Class is
(1) Minoca. (2) Cornish. (3) Australop.
(4) White leghorn. (5) White Plymouth Rock.

17. The area of a floor brooder prepared for a flock of 1000 broiler chicks should be
(1) 10 m^2 (2) 20 m^2 (3) 30 m^2 (4) 40 m^2 (5) 50 m^2

18. An example for a zoonotic disease is
(1) Mastitis. (2) Tick fever. (3) Brucellosis. (4) Coccidiosis. (5) Salmonellosis.

19. Quality of light affects the growth of the plant. Colours of the light promoting the photosynthesis are
(1) blue and red. (2) red and green. (3) yellow and red.
(4) blue and purple. (5) green and yellow.

20. Nutrient content of Urea, Triple Super Phosphate (TSP) and Muriate of Potash (MOP) are
(1) 46% N, 45% P and 60% K respectively.
(2) 46% N, 45% P_2O_5 and 60% K respectively.
(3) 46% NH_4, 45% P and 60% K_2O respectively.
(4) 46% N, 45% P_2O_5 and 60% K_2O respectively.
(5) 46% NO_3, 45% P_2O_5 and 60% K_2O respectively.

21. Tetrasolium test is used to determine the
(1) seed purity. (2) seed viability. (3) seed dormancy.
(4) seed germination. (5) seed heterogeneity.

[*See page three*

22. A chemical used for surface sterilization of ex-plants in micro-propagation is
(1) Clorox. (2) Phenol. (3) Formalin.
(4) NaCl solution. (5) Silver Chloride.

23. Certain plants are cultivated without a potting media. This cultivation method is best identified as,
(1) geoponics. (2) aeroponics. (3) hydroponics.
(4) solid media culture. (5) nutrient film technique.

24. In grafting,
(1) both scion and stock should be from the same species.
(2) stock should be selected from a high yielding variety.
(3) stock should be selected from matured/bearing plants only.
(4) scion should be selected from matured/bearing plants only.
(5) scion should be selected from a mother plant having a deep root system.

25. Seed dormancy is a natural phenomenon to
(1) maintain genetic purity. (2) promote seed germination.
(3) store seeds for a long period. (4) avoid pest and disease incidences.
(5) avoid unfavourable climatic condition.

26. The critical factors to be considered when selecting a nursery potting mixture are
(1) good drainage and good aeration.
(2) water holding capacity and good drainage.
(3) good drainage and high organic matter content.
(4) good aeration and high amount of plant nutrients.
(5) water holding capacity and high amount of plant nutrients.

27. Nutritional needs of a person vary with,
(1) age and sex, but not on physical activity.
(2) age and sex, but not on the body height.
(3) age and body weight, but not on the body height.
(4) physical activity and age, but not on body mass index.
(5) physical activity and body mass index, but not on the sex.

28. An example for food spoilage due to enzymatic reactions is,
(1) souring of milk. (2) curdling of milk.
(3) softening of fruits. (4) developing bad smell in stale fish.
(5) developing alcoholic smell in fruits.

29. An example for "Enhanced Green House Effect" is releasing of
(1) methane from marsh-lands.
(2) methane by cattle through eructation.
(3) water vapour from surface water bodies.
(4) carbon dioxide through burning of fossil fuel.
(5) chlorofluorocarbons (CFCs) due to volcano eruption.

30. A farmer is advised to apply 92 kg of Nitrogen to one hectare of his crop field. The amount of Urea needed for his crop field is
(1) 50 kg (2) 100 kg (3) 150 kg (4) 200 kg (5) 250 kg

31. The main objectives of primary tillage would be,
(1) loosening of soil and control of weeds.
(2) levelling of soil and prevention of soil erosion.
(3) breaking of hardpan of soil and levelling of soil.
(4) prevention of soil erosion and control of weeds.
(5) turning of soil and mixing of soil with organic matter.

[*See page four*

32. The main reason for **not** recommending the sprinkler irrigation for fertigation is due to
(1) corroding the water pumps.
(2) salt burning of leaves of the crop.
(3) blocking of sprinkler heads by fertilizer.
(4) leaking of fertilizer from irrigation lines.
(5) high volatile losses of fertilizer during application.

33. If the amount of water utilized by a particular crop is 10 mm per day, and the amount of water irrigated to the crop is 2 cm per day, the irrigation efficiency would be
(1) 5% (2) 20% (3) 50% (4) 75% (5) 100%

34. One maize line having average height of 40 cm is crossed with another maize line having the average height of 60 cm. The average height of the F1 maize plants was 75 cm. The phenomenon can be best explained as
(1) inbreeding. (2) outbreeding. (3) mutation.
(4) crossbreeding. (5) hybrid vigour.

35. Natural grasslands found in Mahaweli flood plains in the North Central Province are known as
(1) villus. (2) savannas. (3) shrublands.
(4) dry patanas. (5) wet patanas.

36. Of the following, the most potential district for dairy cattle production under free range system is
(1) Jaffna. (2) Matara. (3) Ampara. (4) Kurunegala. (5) Nuwara Eliya.

37. The most correct statement on the effect of climatic factors on livestock farming would be that
(1) high relative humidity can reduce the quality of silage.
(2) high environmental temperature can reduce the quality of layer feeds.
(3) high humidity can aggravate the bad affects of high temperature on farm animals.
(4) short day length can badly affect the feed intake of broiler birds in a closed house.
(5) short day length and windy environment can reduce the breeding efficiency of farm animals.

38. Followings are some statements on incubation of chicken eggs.
A - Large eggs are usually not taken for incubation.
B - Large eggs always contain double yolks.
C - Candling of eggs on the 7^{th} day helps to identify unfertile eggs.
D - Eggs should be transferred from the setter to the hatcher on the 16^{th} day of incubation.
Of the above, the correct statements would be
(1) A and B only. (2) A and C only.
(3) B and C only. (4) B and D only.
(5) C and D only.

39. In general, soil nutrient availability
(1) does not change with Cation Exchange Capacity (CEC) of the soil.
(2) decreases with the increase of CEC of the soil.
(3) does not change with pH value of the soil.
(4) increases with the increase of pH value of the soil.
(5) increases with the increase of CEC of the soil.

40. Some of the soil properties are listed below.
A - Soil pH
B - Soil moisture
C - Soil aeration
D - Soil temperature
Of the above, the properties directly affecting the plant nutrient absorption are
(1) A and B only. (2) B and C only. (3) C and D only.
(4) A, B and C only. (5) A, B and D only.

[*See page five*

41. A potato farmer in upcountry faced the following situation:

A - Bad weather.

B - Increased income of the potato consumers.

As a result of the above situations,

(1) both demand and supply curves of potato shift to the left.
(2) both demand and supply curves of potato shift to the right.
(3) the demand curve of potato shifts to the left and the supply curve of potato shifts to the right.
(4) the demand curve of potato shifts to the right and the supply curve of potato shifts to the left.
(5) there will not be any change in the position of both demand and supply curves of potato.

42. The following are some of the interventions made by the government of Sri Lanka to develop the agricultural sector.

A - Introduction of high yielding varieties.

B - Development of irrigation infrastructure in the dry zone.

C - Provision of fertilizer subsidy.

Of the above, the interventions, directly attributed to the green revolution would be

(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) B and C only.

43. The total cost (TC) of a farm is given as, $TC = 100 + 5Q + 0.1Q^2$, where Q is the number of units of output. The Fixed cost, and the Variable cost when Q = 10 are

(1) 10 and 16 respectively. (2) 10 and 60 respectively.
(3) 100 and 50 respectively. (4) 100 and 60 respectively.
(5) 100 and 160 respectively.

44. The following are two market structures.

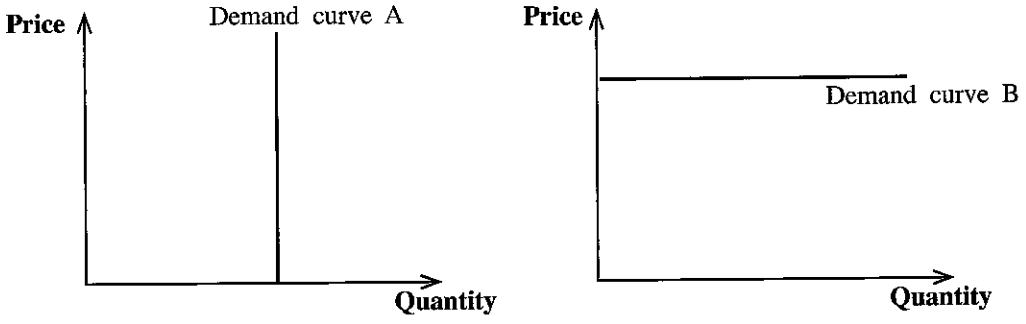
A - Market for paddy: In Sri Lanka paddy market, there are large number of producers and buyers, and the products can be considered as homogeneous.

B - Market for internet services: There are less than 10 competitive internet service providers in Sri Lanka and usually there are barriers to enter into the market.

The correct description of these two market structures is,

(1) market A is monopoly and market B is oligopoly.
(2) market A is oligopoly and market B is monopoly.
(3) market A is oligopoly and market B is perfect competition.
(4) market A is perfect competition and market B is oligopoly.
(5) market A is perfect competition and market B is monopoly.

45. Use the following diagram to answer this question.



According to the above diagram, what is the correct statement with respect to price elasticity of demand of A and B?

(1) A is inelastic while B is elastic.
(2) A is elastic while B is inelastic.
(3) A is unitary elastic while B is perfectly elastic.
(4) A is perfectly inelastic while B is perfectly elastic.
(5) A is perfectly elastic while B is perfectly inelastic.

[*See page six*

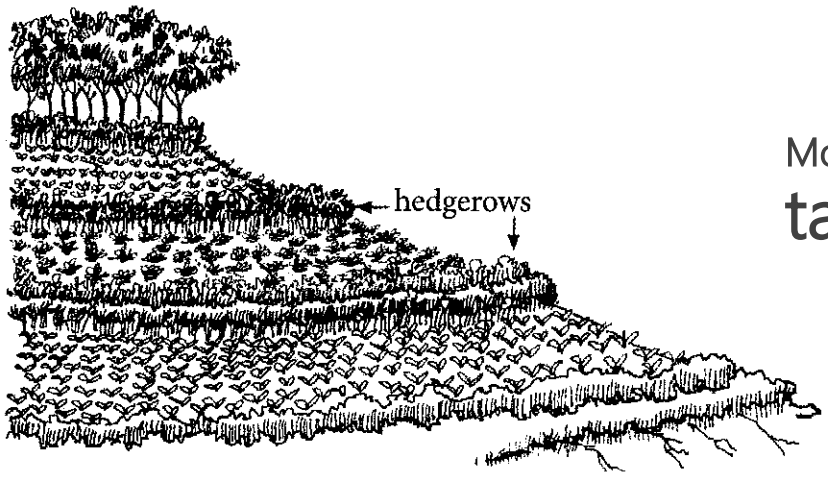
46. The four main components of a business plan are:
(1) Technical plan, production plan, input supply plan and market plan.
(2) Technical plan, social plan, human resources management plan and market plan.
(3) Technical plan, human resources management plan, market plan and finance management plan.
(4) Technical plan, production plan, natural resource management plan and market plan.
(5) Technical plan, production plan, human resources management plan and market plan.

47. The following are some of the changes taken place in rice grains during maturity.
A - Reduction of water content
B - Hardening of the kernel
C - Change of the colour of the seed coat
Of the above, the most contributive changes in reducing post-harvest losses of rice during storage would be
(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) B and C only.

48. The provision of fertilizer subsidy to the farmers is a responsibility of the
(1) Divisional Secretariat.
(2) Department of Agriculture.
(3) Department of Agrarian Development.
(4) Agriculture and Agrarian Insurance Board.
(5) Hector Kobbekaduwa Agrarian Research and Training Institute.

49. A student has noted down the following in his field note-book.
A - Decreased in infiltration
B - Mixed up the soils
C - Stimulated soil microbial activity
Of the above, the earthworms contribution to improve soil health would be for
(1) A only. (2) B only. (3) A and B only.
(4) A and C only. (5) B and C only.

50. Answer the question using the following diagram.



What is the most suitable plant to establish hedgerows in above cropping systems?
(1) A leguminous slow growing plant
(2) A leguminous fast growing plant
(3) A non-leguminous slow growing plant
(4) A non-leguminous fast growing plant
(5) A any plant species having conical canopy

***

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கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2018 ஓகஸ்ற
General Certificate of Education (Adv. Level) Examination, August 2018

කෘෂි විද්‍යාව II விவசாய விஞ்ஞானம் II **Agricultural Science II**	**08 E II**	**11.08.2018 / 1300 – 1610**

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

අමතර කියවීම් කාලය - මිනිත්තු 10 යි
மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time - 10 minutes

Use **additional reading time** to go through the question paper, select the questions and decide on the questions that you give priority in answering.

Index No. : .....

Instructions:

* *This question paper consists of* **10** *questions in* **10** *pages.*
* *This question paper comprises Part* **A** *and Part* **B.** *The time allotted for* ***both parts*** *is* ***three hours.***

PART A — Structured Essay (Pages 2 - 9)

* *Answer* ***all four*** *questions on this paper itself.*
* *Write your answers in the space provided for each question. Note that the space provided is sufficient for your answers and extensive answers are* ***not*** *expected.*

PART B — Essay (Page 10)

* *Answer* ***four*** *questions only. Use the papers supplied for this purpose. At the end of the time allotted for this paper, tie the two parts together so that Part* **A** *is on the top of Part* **B** *before handing over to the supervisor.*
* *You are permitted to remove only Part* **B** *of the question paper from the Examination Hall.*

For Examiners' Use only

(08) Agricultural Science - II

Part	Question No.	Marks
A	1	
	2	
	3	
	4	
B	5	
	6	
	7	
	8	
	9	
	10	
Total		
Percentage		

Final Marks

In Numbers	
In Letters	

Code Numbers

Marking Examiner 1	
Marking Examiner 2	
Marks checked by	
Supervised by	

[see page two

Part A - Structured Essay

*Answer **all** questions **on this paper itself.***

*(Each question carries **10** marks.)*

Do not write in this column

1. (A) Weeds reduce the crop yields by competing with crops for water and nutrients.

(i) State the **three** classes of weeds based on their morphological characters.

(1) .....

(2) .....

(3) .....

(ii) Define "integrated weed management".

.....

.....

.....

(iii) State **two** types of weedicides, based on their mode of action in the plants.

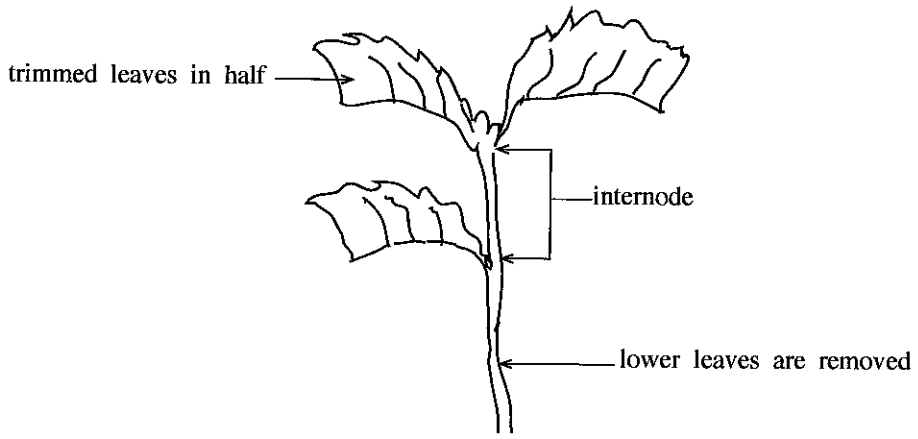
(1) .....

(2) .....

(iv) Of the above two types of weedicides, what is the most suitable type to control Couch grass (*Panicum repens*)?

.....

(B) Use the following diagram to answer questions (i) to (vii).



(i) State **two** important characters to be considered in selecting the mother plant to obtain above cutting for propagation.

(1) .....

(2) .....

(ii) State the reason why the knife used to obtain this cutting from the mother plant should be sharp and clean.

.....

.....

(iii) What should be the approximate length of the above cutting?

.....

[see page three

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(iv) What treatment should be done to promote rooting of the cutting?

.....

(v) Why is it necessary to remove the lower leaves of the stem cutting?

.....

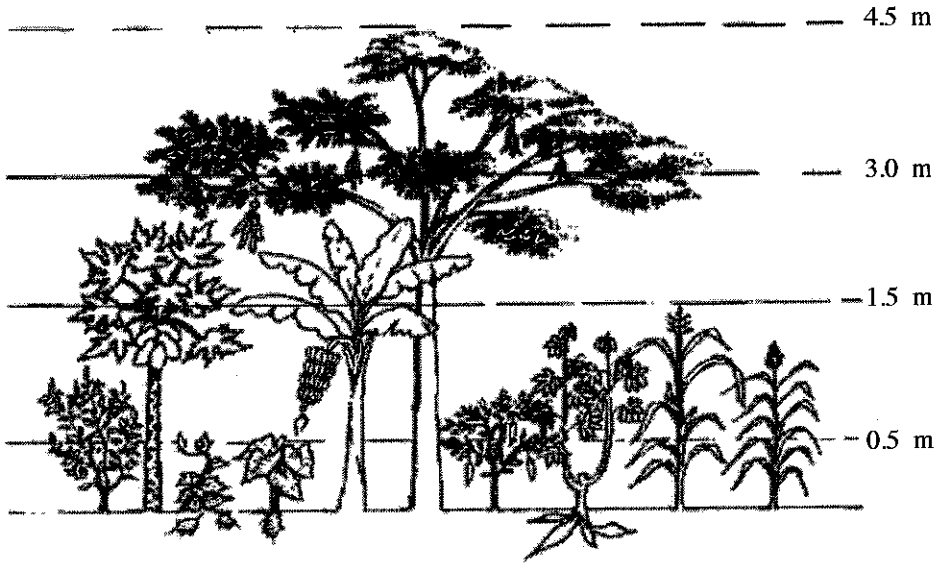
(vi) Why should a half of the each remaining leaf of the cutting be removed?

.....

(vii) Why should a half of the each remaining leaf be remained intact?

.....

(C) Use the following diagram to answer questions (i) to (iii)



(i) Name the above cropping system.

.....

(ii) State **two** advantages of this cropping system with respect to food security.

(1) .....

(2) .....

(iii) State **two** advantages of this cropping system with respect to utilization of natural resources.

(1) .....

(2) .....

[see page four

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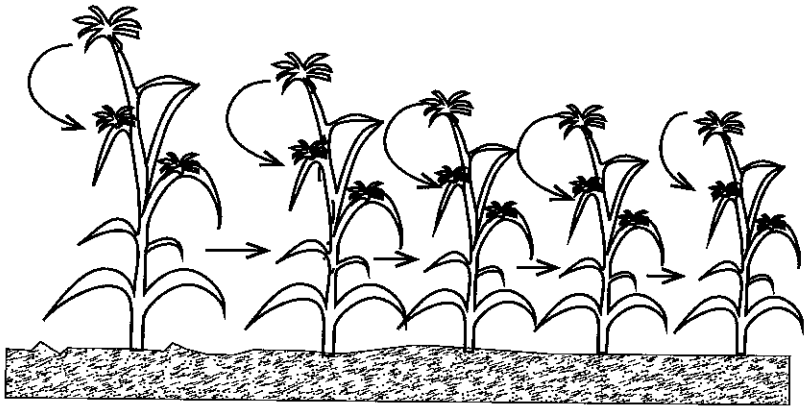
(D) Use the following diagram to answer questions (i) to (iii).



(i) Name the pollination technique used in the above breeding method.

.....

(ii) Why are subsequent generations becoming shorter in the above breeding method?

.....

(iii) What is the main objective of this breeding process?

.....

(iv) Define "hybrid vigour".

.....

.....

.....

2. (A) Bulk density is considered as an important physical characteristic of a soil.

(i) What is soil bulk density?

.....

.....

.....

(ii) State **four** main advantages of having a knowledge on the soil bulk density for a farmer.

(1) .....

(2) .....

(3) .....

(4) .....

(iii) In an experiment conducted to measure the bulk density of a particular soil, a soil sample was taken using a galvanized tube, placed in a container and dried to a constant weight in an oven.

Weight of the soil sample and the container	= 150 g
Weight of the container	= 100 g
Volume of the soil sample	= 5 cm^3

Calculate the bulk density of the soil.

.....

.....

.....

[see page five

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(B) State **three** research institutes in Sri Lanka that work on perennial crops together with their locations.

	Name of the research institute	**Location**
(i)	.....	.....
(ii)	.....	.....
(iii)	.....	.....

(C) Diseases and nutrient deficiencies in crops may cause pre and post-harvest losses.

(i) Distinguish between a disease from a nutrient deficiency.

.....

.....

.....

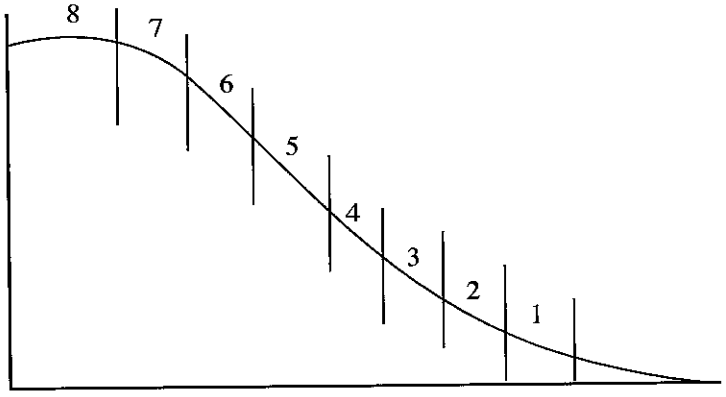
(ii) State an example for each of the following modes of disease transmission.

(1) Seed borne: .....

(2) Soil borne: .....

(3) Air borne: .....

(D) Following diagram illustrates the physical land classification. Use this diagram to answer questions (i) to (iv).



State the nature of the land and a suitable crop to be cultivated in each of the following land classes, shown in the above diagram.

	Land class	**Nature of the land**	**Suitable crop**
(i)	1	.....	.....
(ii)	2	.....	.....
(iii)	5	.....	.....
(iv)	8	.....	.....

(E) State **three** main characteristics used in defining a plant hormone.

(i) .....

(ii) .....

(iii) .....

[see page six

(F) The following graph shows the soil water content in different soil texture classes. Use this graph to answer questions (i) and (ii).

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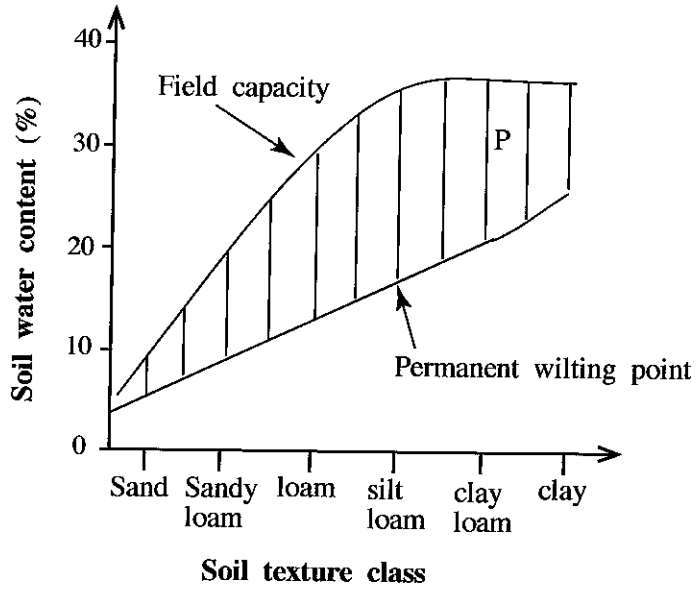


(i) Name the water content found in P area of the above graph.

.....

(ii) Name a soil texture class having the highest water content named in question (i) above.

.....

3. (A) Name a large scale state-owned dairy farm and a large scale private-owned dairy farm found in Sri Lanka.

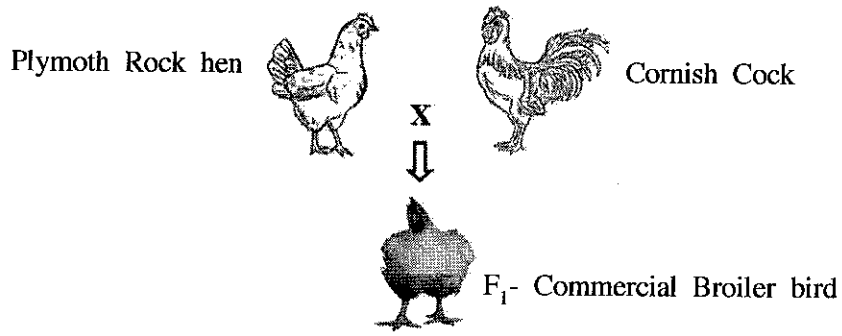
(i) A large scale state-owned dairy farm:

.....

(ii) A large scale private-owned dairy farm:

.....

(B) The following diagram shows a breeding method used in commercial broiler production.



(i) Name the above breeding method.

.....

(ii) Write the main reason for using F_1 generation as the commercial broiler birds.

.....

[see page seven

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(C) Name **two** feedstuffs that can be used as energy supplements in poultry feeds.

(i) .....

(ii) .....

(D) List **two** characteristics of good quality grass silage.

(i) .....

(ii) .....

(E) Write **two** important management practices needed to obtain clean eggs from a layer flock.

(i) .....

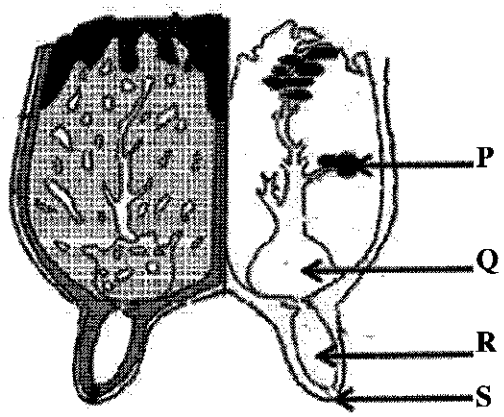
(ii) .....

(F) State **two** external characteristics that can be used in selecting eggs for incubation.

(i) .....

(ii) .....

(G) The following diagram illustrates the internal structure of a mammary system of a cow. Use this diagram to answer questions (i) to (iv).



Name the parts labelled as **P**, **Q**, **R** and **S** in the above diagram

(i) **P** .....

(ii) **Q** .....

(iii) **R** .....

(iv) **S** .....

(H) Animal diseases are caused by different causal agents. Name the type of causal agent for each of the following animal disease conditions.

(i) Milk fever in cattle: .....

(ii) Coccidiosis in chicken: .....

(iii) Foot and mouth disease in cattle: .....

(iv) Gamboro disease in chicken: .....

[see page eight

(I) State **two** major reasons for reducing the post-harvest losses of fruits and vegetables when stored under refrigerated conditions.

(i) .....

(ii) .....

(J) State **two** main advantages of packaging of foods.

(i) .....

(ii) .....

(K) Write **two** mandatory information need to be stated on the main panel of a food label, according to the food labelling regulation of the Food Act No. 26 of 1980.

(i) .....

(ii) .....

Do not write in this column

4. (A) A fertilizer mixture with 5:10:10 fertilizer grade is recommended to apply for a crop. Calculate the amount of Urea, Triple Super Phosphate and Muriate of Potash required to prepare 100 kg of the above fertilizer mixture.

(i) Urea (kg)

.....

.....

(ii) Triple Super Phosphate (kg)

.....

.....

(iii) Muriate of Potash (kg)

.....

.....

(B) Vegetative propagation is commonly used in propagation of crops. State the most commonly used type of propagules to propagate following crops.

Crop	**Type of propagule**
(i) Cannas	.....
(ii) Dahlia	.....
(iii) Croton	.....
(iv) Mango	.....
(v) Banana	.....

(C) Different types of seed treatments are used to break the seed dormancy. State the most suitable seed treatment to break the dormancy of each of the following seeds.

Seed type	**Type of seed treatment**
(i) Winged bean	.....
(ii) Paddy	.....
(iii) Mango	.....
(iv) Tomato	.....

[see page nine

Do not write in this column

(D) Most of the Sri Lankans use big onion as a substitute to red onion. During a particular growing season red onion cultivation was severely damaged by a fungal disease, but had no effect on the big onion cultivation.

(i) What would happen to the supply curve of the big onions?

.....

(ii) What would happen to the demand curve of the big onions?

.....

(iii) What would happen to the equilibrium price of the big onions?

.....

(E) The inputs and the corresponding outputs of a particular production process are given below.

Units of input	1	2	3	4	5
Units of output	20	50	90	120	140

(i) What is the average product when 4 units of the input are used?

.....

(ii) What is the marginal product when inputs are used in between 4 and 5 units?

.....

(iii) In a typical production function, when marginal product becomes zero, what would happen to the total product?

.....

(F) Green revolution brought positive and negative impacts to the Sri Lankan agriculture.

(i) State **two** positive impacts of green revolution.

(1) .....

(2) .....

(ii) State **two** negative impacts of green revolution.

(1) .....

(2) .....

**

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கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2018 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2018

කෘෂි විද්‍යාව	II
விவசாய விஞ்ஞானம்	II
Agricultural Science	**II**

08 E II

Part B - Essay

Instructions:

* *Answer **four** questions only.*
* *Give clearly labelled diagrams where necessary.*
  Each question carries **15** *marks.*

5. (i) Describe the most commonly used techniques to control environmental factors in protected plant houses in low country of Sri Lanka.

(ii) State the common symptoms of sick farm animals. What precautions can be taken to control diseases in a livestock farm?

(iii) Stating examples, explain the importance of using appropriate harvesting techniques and immediate post-harvest treatments to control post-harvest losses of food crops.

6. (i) State the advantages of layering as compared to other vegetative propagation methods and explain the physiological process of rooting in layering.

(ii) Explain various milking methods practiced by dairy farmers.

(iii) Stating examples, describe different applications of temperature regulation for food preservation.

7. (i) Describe the advantages and disadvantages of Artificial Insemination (AI) in cattle as compared to natural mating under local conditions.

(ii) Describe the factors affecting the demand and supply of rice in Sri Lanka.

(iii) What is "enhanced greenhouse effect"? Explain the causes of enhanced greenhouse effect.

8. (i) Describe the impacts of soil degradation.

(ii) Describe the strategies that can be practically used to increase the fertilizer use efficiency.

(iii) Describe the different designs of drainage systems used in agricultural lands.

9. (i) Describe the special nurseries explaining their practical uses in crop production.

(ii) Stating examples, describe the objectives of seed treatments.

(iii) Describe different methods of controlling transpiration in crops.

10. (i) Describe different weed control methods.

(ii) Using an appropriate example, explain how to prepare a business plan for a small agribusiness.

(iii) State agricultural activities that create harmful effects to the environment and describe mitigation measures.

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ජීව විද්‍යාව	I	09 E I
உயிரியல்	I	
Biology	**I**	

06.08.2018 / 1300 – 1500

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two hours

Instructions:

* *Answer **all** questions.*
* *Write your **Index Number** in the space provided in the answer sheet.*
* *Instructions are given on the back of the answer sheet. Follow those carefully.*
* *In each of the questions **1** to **50**, pick one of the alternatives from* (1), (2), (3), (4), (5) *which is **correct** or **most appropriate** and **mark your response on the answer sheet with a cross** (×) on the number of the correct option in accordance with the instructions given on the back of the answer sheet.*

1. Which of the following takes place in the metaphase of mitosis?
(1) Formation of spindle
(2) Condensation of chromosomes
(3) Disappearance of nucleolus
(4) Aligning chromosomes in the middle of the cell
(5) Breaking down of nuclear membrane

2. Which of the following **cannot** be seen in a typical plant cell when observed under a light microscope?
(1) Chloroplasts (2) Starch granules (3) Nucleus
(4) Mitochondria (5) Vacuoles

3. Which of the following biochemical processes requires ATP?
(1) Photolysis of water during photosynthesis
(2) Absorption of K^+ into root hair cells from soil solution
(3) Diffusion of oxygen into living cells through cell membrane
(4) Attaching a carbon dioxide molecule to RuBP in the Calvin cycle
(5) Conversion of pyruvate to PEP in C4 pathway

4. Which of the following statements regarding the elements found in living matter is correct?
(1) There are 92 naturally occurring elements in living matter.
(2) Composition of elements in organisms is not constant.
(3) Elements found in organisms in less than 0.1% in dry weight are considered as trace elements.
(4) Iron is an example for a macroelement found in all organisms.
(5) Carbon, hydrogen, oxygen, nitrogen, phosphorus and magnesium are the six most abundant elements of living matter.

5. Having strong adhesive and cohesive forces is an important physical property of water molecules. Which of the following functions of plants is **not** associated with this property?
(1) Mechanical support in herbaceous plants
(2) Absorption of water from soil
(3) Turgor movements
(4) Transport of water within plant
(5) Dissolving of materials in protoplasm

[*See page two*

6. All features given in which one of the following responses are present in a plant with trimerous flower parts?
   (1) Parallel veins in leaves, embryos with one cotyledon, fibrous roots, branched lipids in cell membrane
   (2) Seeds in fruits, dominant sporophyte, several kinds of RNA polymerases, scattered vascular bundles in stem
   (3) Embryos with one cotyledon, photosynthetic gametophyte, vascular bundles in the stem without cambia, unbranched lipids in cell membrane
   (4) Parallel veins in leaves, heterospory, fibrous roots, protein synthesis that begins with formyl methionine
   (5) Scattered vascular bundles in stem, perianth, naked seeds, unbranched lipids in cell membrane

7. A unicellular protist without flagella
   (1) could be sensitive to penicillin.
   (2) may contain fucoxanthin.
   (3) could be heterotrophic.
   (4) may belong to phylum Rhodophyta.
   (5) may contain phycocyanin.

8. Which of the following statements regarding classification of organisms is correct?
   (1) Viruses do not belong to any kingdom as they do not have a well organized nucleus.
   (2) Protista is a natural kingdom where organisms with different evolutionary origins are included.
   (3) The number of common characteristics found within a genus is higher than that of a species.
   (4) The kingdom of plants was first identified by Carolus Linnaeus.
   (5) Robert Whittaker introduced the three domain classification.

9. Which of the following may be present in a bilaterally symmetrical coelomic animal with tentacles and without a ventral heart?
   (1) Spines (2) Nerve ring (3) Antennae (4) Gills (5) Pinnules

10. Which of the following statements regarding the digestive system of man is correct?
    (1) Longitudinal muscles in the stomach are located between the circular muscles and sub-mucosa.
    (2) Secretion of gastric juice is stimulated by parasympathetic nervous system.
    (3) Spaces between two microvilli in small intestine are called crypts of Lieberkuhn.
    (4) Secretin stimulates the contraction of gall bladder to release bile into duodenum.
    (5) Microvilli in small intestine are visible under low power of the optical microscope.

11. Which of the following statements regarding regulation of breathing in man is correct?
    (1) It is regulated by the respiratory centres located in medulla oblongata and hypothalamus.
    (2) Due to stimulation of inspiratory centre of medulla oblongata, nerve impulses are sent to external intercostal muscles.
    (3) Increase in the pH of arterial blood stimulates chemoreceptors in aorta.
    (4) Stimulation of stretch receptors in lungs inhibits expiratory centre.
    (5) Stimulation of expiratory centre results in the contraction of diaphragm.

12. Transport of water and minerals in plants
    (1) occurs in both directions.
    (2) is not aided by transpiration.
    (3) is an active process.
    (4) is explained by pressure flow hypothesis.
    (5) occurs under a negative pressure gradient.

[*See page three*

13. Characteristics of two plant cells named P and Q are given below.
Cell P: Thick secondary cell wall, isodiametric, pits in cell wall, large lumen
Cell Q: Thick secondary cell wall, not isodiametric, no pits in cell wall, narrow lumen
The cells P and Q are respectively
(1) a companion cell and a vessel element.
(2) a sieve tube element and a trachied.
(3) a vessel element and a sclerenchyma cell.
(4) a vessel element and a trachied.
(5) a trachied and a vessel element.

14. Which of the following statements regarding circulatory systems of animals is correct?
(1) Open circulatory system with ventral heart is present in mollusks.
(2) Closed circulatory system is found in nematodes.
(3) Haemoerythrin is the blood pigment of crustaceans.
(4) AV node is the pacemaker of human heart.
(5) In human heart, mitral valve is found between the left auricle and left ventricle.

15. Pons Varolii of humans is involved in
(1) regulation of blood pressure.
(2) recognition of sensory information.
(3) regulation of ventilation of lungs.
(4) regulation of the rate of heart beat.
(5) regulation of reflex movements of eye muscles.

16. Select the correct statement regarding human ear.
(1) Its normal hearing range is 40 - 20000 Hz.
(2) Incus is connected to the oval window.
(3) Pinna is composed of hyaline cartilage.
(4) Membranous labyrinth is filled with perilymph.
(5) Organ of Corti is associated with auditory function.

17. In humans, parasympathetic stimulations
(1) dilate the pupil of eye.
(2) decrease the rate of heart beat.
(3) increase secretion of sweat.
(4) dilate bronchi.
(5) increase conversion of glycogen to glucose in the liver.

18. Select the correct statement regarding action potential of a human neurone.
(1) K^+ influx into the neurone occurs during repolarization phase of action potential.
(2) Duration of an action potential is about 5 milliseconds.
(3) Na^+ efflux from the neurone occurs during depolarization phase of action potential.
(4) It is a transient reversal of polarity of the nerve cell membrane.
(5) Immediately after one action potential, another action potential can be produced.

19. Select the correct statement regarding human hormones.
(1) Insulin is secreted by α-cells of islets of Langerhans.
(2) Aldosterone is the main glucocorticoid secreted from the adrenal cortex.
(3) Parathyroid hormone reduces blood calcium level.
(4) Thyroxine increases heat production of the body.
(5) Inhibin stimulates the secretion of FSH.

20. Select the plant growth substance which stimulates elongation of internodes and activates the enzymes in seed germination.
(1) Ethylene (2) Abscisic acid (3) Cytokinin
(4) Gibberellin (5) Auxin

[See page four

21. Which of the following statements regarding excretion is correct?
(1) Simple excretory system with longitudinal canals are found in nematodes.
(2) Nephridia are excretory structures found only in annelids.
(3) In humans, kidney is the main site of urea synthesis.
(4) Water conservation is highest when urea is produced as the nitrogenous excretory product.
(5) Ammonia is the main nitrogenous excretory product of marine bony fishes.

22. Which of the following is **not** likely to be found in human milk?
(1) Vitamin B_{12} and vitamin D (2) Casein (3) Galactose
(4) Fatty acids (5) Calcium

23. Select the correct statement regarding human ribs.
(1) They are short and curved bones.
(2) Superior surface of ribs is deeply grooved.
(3) There are 14 pairs of ribs.
(4) The first eight pairs of ribs articulate directly with the sternum.
(5) All ribs articulate posteriorly with the vertebral column.

24. Which of the following statements regarding human upper limb is correct?
(1) Humerus is the longest and heaviest bone in the body.
(2) Radius is longer than ulna.
(3) Head of radius articulates with ulna.
(4) Wrist is made up of seven carpal bones.
(5) Distal end of humerus articulates only with ulna.

25. In humans, inhibin is secreted by
(1) prostate glands. (2) epididymis. (3) seminal vesicles.
(4) testes. (5) Cowper's glands.

26. Select the correct statement regarding thigmotropism.
(1) It can be seen in male gametes of some plants.
(2) Auxins are not involved in it.
(3) Unequal elongation in different regions of plant can occur during it.
(4) Pollen tube growing towards ovule is an example for it.
(5) Cytokinins are involved in it.

27. The male gametophyte of a flowering plant is the
(1) pollen sac. (2) microspore.
(3) sperm cell. (4) microspore mother cell.
(5) pollen grain.

28. When a red flowered plant of a certain species is crossed with a white flowered plant of the same species, all progeny were pink flowered. This type of inheritance results in due to
(1) Mendelian inheritance. (2) polygenic inheritance. (3) codominance.
(4) incomplete dominance. (5) polyallelism.

29. This question is based on the statement with three blanks given below.
"Variants of genes, which are called ....., arise due to ..... that occur as a result of mistakes in ....."
Which of the following indicates in correct order, the terms that are best suited to fill the blanks of the above statement?
(1) genotypes, variations, DNA replication
(2) alleles, mutations, transcription
(3) alleles, mutations, DNA replication
(4) mutants, variations, protein synthesis
(5) heterozygotes, mutations, meiosis

[*See page five*

30. Turner syndrome is best illustrated in which of the following persons?
(1) A girl born with a gene mutation on X chromosome
(2) A boy born with a gene mutation on Y chromosome
(3) A boy or a girl born with only one X chromosome
(4) A girl born with only one X chromosome
(5) A boy born with an additional Y chromosome

31. A genetically modified organism is different from other members of the same species because
(1) it carries an extra chromosome.
(2) it carries a gene or genes from another organism.
(3) it is generated by cloning of another organism.
(4) it cannot produce fertile offspring by interbreeding with other members of the same species.
(5) its gene expression is well regulated.

32. Select the **incorrect** statement regarding an expert in genetic counselling.
(1) He is knowledgeable on genetic disorders of humans.
(2) He advices persons with genetic disorders about the nature of the problem.
(3) He advices to abort a foetus if one of the parents is a carrier of a genetic disorder.
(4) He helps family members of the person with genetic disorder to manage the situation.
(5) He explains the persons with genetic disorder and family members how the disorder is inherited.

33. In an ecosystem, gross primary productivity and the amount of energy available at the third trophic level were determined to be 2000 kJ m^{-2} $year^{-1}$ and 11 kJ m^{-2} $year^{-1}$ respectively. If 90% of energy is lost when flows from one trophic level to the next, the amount of energy used for respiration by the primary producers in this ecosystem is
(1) 900 kJ m^{-2} $year^{-1}$.
(2) 990 kJ m^{-2} $year^{-1}$.
(3) 1010 kJ m^{-2} $year^{-1}$.
(4) 1100 kJ m^{-2} $year^{-1}$.
(5) 1800 kJ m^{-2} $year^{-1}$.

34. Clearing of forests contributes to
(1) increase the concentration of heavy metals in plants.
(2) skin cancer.
(3) eroding of limestone monuments.
(4) sea level rise.
(5) reduce the range of spread of tropical diseases.

35. Experiments of Stanley Miller
(1) provided evidence for the theory of spontaneous generation of life.
(2) showed that primodial soup contained a large amount of organic molecules.
(3) showed that organic molecules can be formed from inorganic gases.
(4) provided evidence for the theory presented by Schleiden, Schwann and Virchow.
(5) showed that life originated about 3500 million years ago.

36. *Nitrosomonas* is
(1) a chemoautotroph which reduces N_2 to NH_4^+.
(2) a chemoheterotroph which oxidises NH_4^+ to NO_2^-.
(3) a chemoautotroph which oxidises NH_4^+ to NO_2^-.
(4) a chemoautotroph which reduces NO_3^- to NO_2^-.
(5) a chemoheterotroph which reduces N_2 to NH_4^+.

[*See page six*

37. If a component in a culture medium is liable to be destroyed when exposed to high temperature, the best way to prepare that culture medium is to
(1) heat the medium at 80 °C for two hours.
(2) autoclave the medium and filter through a membrane filter with 0.45 μm pores.
(3) autoclave the medium without the heat labile component and the solution of heat labile component separately, and mix them after cooling.
(4) autoclave the medium without the heat labile component, filter the solution of heat labile component through a membrane filter with 0.45 μm pores and mix after cooling.
(5) mix all components of the medium in a glass flask and sterilize using ultraviolet radiation.

38. A characteristic feature of fungi is
(1) having cell walls made up of glycopeptides.
(2) having heterotrophic absorptive nutrition.
(3) ingestion of food and digestion.
(4) storing food as starch.
(5) reproduction by endospores.

39. Which of the following statements regarding the use of sanitary landfills is correct?
(1) It is not a good choice due to high operational costs.
(2) It involves dumping of municipal solid waste to wetland areas for land filling.
(3) It is a method of reducing the volume of solid waste.
(4) It is limited due to low ground water level in many regions.
(5) It does not involve decomposition of waste.

40. Food preservation is based on the following principles.
a - Prevention of entry of microorganisms into food
b - Prevention of growth and activity of microorganisms in food
c - Removal or killing of microorganisms in food
Canning of food is based on which of the above principles?
(1) **a**, **b** and **c** (2) **a** and **b** only. (3) **a** and **c** only.
(4) **b** and **c** only. (5) **c** only.

● **For each of the questions 41 to 50 one or more of the responses is/are correct. Decide which response/responses is/are correct and then select the correct number.**

If only A, B and D are correct **1**
If only A, C and D are correct **2**
If only A and B are correct **3**
If only C and D are correct **4**
If any other response or combination of responses is correct **5**

Directions summarised				
1	**2**	**3**	**4**	**5**
A, B, D correct.	A, C, D correct.	A, B correct.	C, D correct.	Any other response or combination of responses correct.

41. Which of the following indicates/indicate the examples for some hierarchical levels of biological organization in correct order?
(A) DNA, nucleus, muscle fibre, circular muscles, stomach
(B) Crow, flock of crows, flock of birds, home garden, biosphere
(C) Neurilemma, axon, neurone, brain, nervous system
(D) Amino acids, endoplasmic reticulum, neutrophils, blood vessels, blood
(E) Toad, Amphibia, Chordata, Animalia, Eukariya

[*See page seven*

42. Glycolipids are synthesized by which of the following organelle/organelles?
(A) Lysosome (B) Microbody (C) Golgi complex
(D) Endoplasmic reticulum (E) Mitochondrium

43. Which of the following is/are found only in plant tissues?
(A) Glyoxisomes (B) Plasmodesmata (C) Lysosomes
(D) Peroxisomes (E) Tight junctions

44. A poikilothermic animal with urea as the major nitrogenous waste may have which of the following structure/structures?
(A) Gills (B) Four-chambered heart (C) Neck
(D) Lungs (E) Beak

45. Which of the following statements regarding the absorption of end products of digestion in man is/are correct?
(A) Glucose is absorbed actively in the small intestine.
(B) Triglycerides are synthesized in the epithelial cells of villi of small intestine.
(C) Amino acids are absorbed into blood capillaries of villi of small intestine by diffusion.
(D) Fatty acids and glycerol are absorbed into lymphatic vessels of villi of small intestine.
(E) Maltose is absorbed actively into the epithelial cells of villi of small intestine.

46. Which of the following statements regarding human erythrocytes is/are correct?
(A) They are produced in red bone marrow.
(B) They transport both oxygen and carbon dioxide.
(C) Their diameter is about 10 μm.
(D) They are destroyed in the spleen.
(E) The normal range of erythrocyte count in a healthy adult man is 3.8 – 5.8 million/mm^3.

47. In the proximal convoluted tubule of human nephron, which of the following is/are actively reabsorbed?
(A) Na^+ (B) K^+ (C) Amino acids
(D) Glucose (E) Urea

48. Which of the following statements regarding skeletal muscle is/are correct?
(A) They have gap junctions.
(B) They fatigue easily.
(C) Each of their fibres contains several sarcomeres.
(D) They are extensible.
(E) Their fibres are short, cylindrical and unbranched.

49. Regarding human uterus, which of the following statements is/are correct?
(A) Both oestrogen and progesterone stimulate contractions of myometrium.
(B) Uterine secretions nourish the foetus.
(C) Oestrogen stimulates the formation of oxytocin receptors in the myometrium.
(D) Implantation of embryo in the uterus commences by about seventh day following fertilization.
(E) Endometrium is made up of stratified squamous epithelial cells.

50. Which of the following indicates/indicate a characteristic feature of each of the savannas, dry mixed evergreen forests, tropical rain forests and montane forests in correct order?
(A) Fire resistant trees, no clear stratification, continuous canopy, evergreen trees
(B) Evergreen trees, deciduous plants, clear stratification, trees with twisted trunks
(C) Grass, evergreen trees, no clear stratification, xerophytic plants
(D) Grass, fire resistant trees, evergreen trees, no clear stratification
(E) Evergreen trees, no clear stratification, stunted trees, trees with twisted trunks

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