සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved]

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka
இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2021(2022)
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2021(2022)
General Certificate of Education (Adv. Level) Examination, 2021(2022)

තාක්ෂණවේදය සඳහා විද්‍යාව I தொழினுட்பவியலுக்கான விஞ்ஞானம் I **Science for Technology I**	**67 E I**	පැය දෙකයි இரண்டு மணித்தியாலம் ***Two hours***

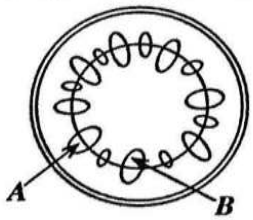
Instructions:

- * *Answer **all** the questions.*
- * *Write your **Index Number** in the space provided in the answer sheet.*
- * *Read the instructions given on the back of the answer sheet 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** (×) **in accordance with the instructions given on the back of the answer sheet.***
- * ***Use of non-programmable calculators is allowed.***

1. Which cellular structure is common in both prokaryotic and eukaryotic cells?
(1) Plasma membrane (2) Lysosome (3) Golgi bodies
(4) Mitochondria (5) Peroxisome

2. Amylase enzyme is produced by
(1) *Escherichia coli.* (2) *Aspergillus niger.*
(3) *Aspergillus oryzae.* (4) *Saccharomyces cerevisiae.*
(5) *Corynebacterium glutamicum.*

3. A cross section of a plant stem is shown in the picture.



Correct labelling of *A* and *B* are respectively
(1) Cortex and Phloem. (2) Xylem and Phloem.
(3) Cambium and Phloem. (4) Phloem and Xylem.
(5) Phloem and Cambium.

4. Consider the following statements regarding plant tissues.
A - Meristematic and permanent tissues are two main types of plant tissues.
B - Parenchyma, collenchyma and sclerenchyma tissues are abundant meristematic tissues in plants.
C - The cells present in meristematic tissues are continuously divided to produce new cells.
Of the above, the correct statement/s would be
(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) A and C only.

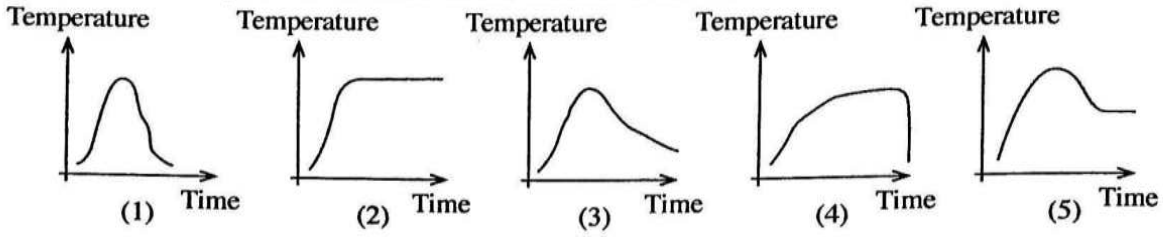
5. What is the main function of kinase enzyme?
(1) Digestion of lipids into fatty acids
(2) Phosphorylation of protein
(3) Digestion of enzymes to amino acids
(4) Digestion of medicines
(5) Metabolization of medicines into water soluble compounds

[*See page two*

6. What is the unit of retention factor (R_f) calculated in a thin layer chromatographic experiment?
(1) cm (2) cm^2 (3) cm^{-1} (4) $cm\ s^{-1}$ (5) No units

7. What chemical is used to remove lignin from wood in the paper industry?
(1) clay (2) chlorine
(3) calcium carbonate (4) sodium hydroxide
(5) sodium hypochloride

8. When equal volumes of 1 mol dm^{-3} HCl and 1 mol dm^{-3} NaOH are mixed, which graph correctly shows the temperature variation of the mixture with time?



9. All chemical reactions
(1) are exothermic.
(2) are single step reactions.
(3) are always require a catalyst.
(4) are endothermic and single step reactions.
(5) reactants must collide with each other to react.

10. Phthalates are used in the process of plastic production
(1) as a colouring agent. (2) as a stabilizing agent.
(3) as a filling agent. (4) to increase the flexibility.
(5) as a fire retarding material.

11. When multiple methods are available for a chemical industry, the method selected for a sustainable industry needs to
(1) recycle waste produced.
(2) utilize a large quantity of water.
(3) depend only on manpower.
(4) be based on imported raw materials.
(5) a method that uses fossil fuels.

12. Consider the following statements regarding hydrogen produced using fossil fuels.
A - Combustion of hydrogen gas produces poisonous gases.
B - Hydrogen production process increases the amount of CO_2 in the environment.
C - Combustion of hydrogen gas produces H_2O.
Of the above, the correct statement/s would be
(1) A only. (2) B only. (3) C only.
(4) A and B only. (5) B and C only.

13. What is the correct statement regarding proteins?
(1) Collagen is used to produce gelatin.
(2) All catalysts are proteins.
(3) All proteins are globular proteins.
(4) 'Whey protein' is found in corn starch.
(5) Gluten is found in eggs.

14. Caffeine in coffee is
(1) an alkaloid. (2) an antioxidant. (3) an essential oil.
(4) a primary metabolite. (5) a polyphenolic compound.

15. What is a process that can occur in the environment?
(1) Increase of the pH of ocean water due to the dissolution of CO_2.
(2) Combustion of wood releases new carbon to the environment.
(3) CO_2 gas in the atmosphere produces acid rain.
(4) Ozone amount near to the earth surface can be increased due to pollution.
(5) Ethane released by cattle creates green house effect.

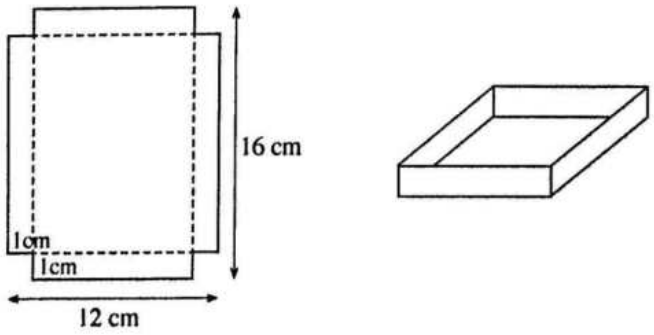
16. Consider the following statements regarding the uses of microorganisms.
A - for the production of fertilizers
B - for the production of food supplements
C - for the removal of poisonous organic compounds at the tertiary water purification stage
Of the above, the correct statement/s would be
(1) A only. (2) A and B only. (3) A and C only.
(4) B and C only. (5) all A, B and C.

17. What is the correct statement regarding carbohydrates?
(1) Carbohydrates contain nitrogen.
(2) Glucose is the sweetest natural sugar.
(3) Amylopectin is a branched polysaccharide.
(4) Simple sugars can be hydrolyzed further into smaller molecules.
(5) Nitrocellulose is commonly used for the production of fabrics.

18. What is the true statement regarding enzymes?
(1) Enzymes are pH resistance.
(2) Enzymes are active even at higher temperatures.
(3) Enzymes can be carbohydrates or proteins.
(4) Most enzymatic reactions produce multiple by-products.
(5) Some enzymes need a cofactor to maintain their function.

19. What distance has a bicycle ridden, if its wheel of radius 20 cm has turned 2500 rounds when it is ridden? (Consider $\pi = 3$)
(1) 350 m (2) 1200 m (3) 3000 m (4) 3500 m (5) 4000 m

20. An open-top box is made by removing four squares of side length 1 cm out of each corner of a rectangular piece of cardboard of length 16 cm and width 12 cm and by folding the tabs along the creases shown.



The volume of the box is
(1) 96 cm^3 (2) 140 cm^3 (3) 165 cm^3 (4) 192 cm^3 (5) 280 cm^3

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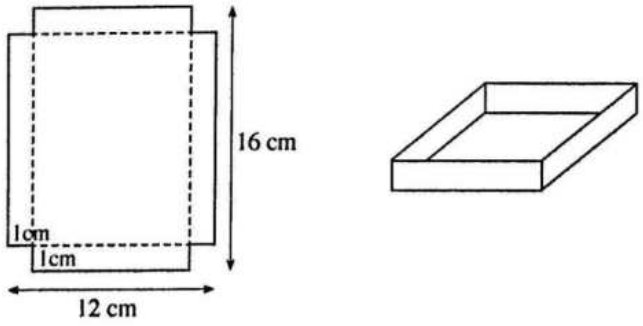
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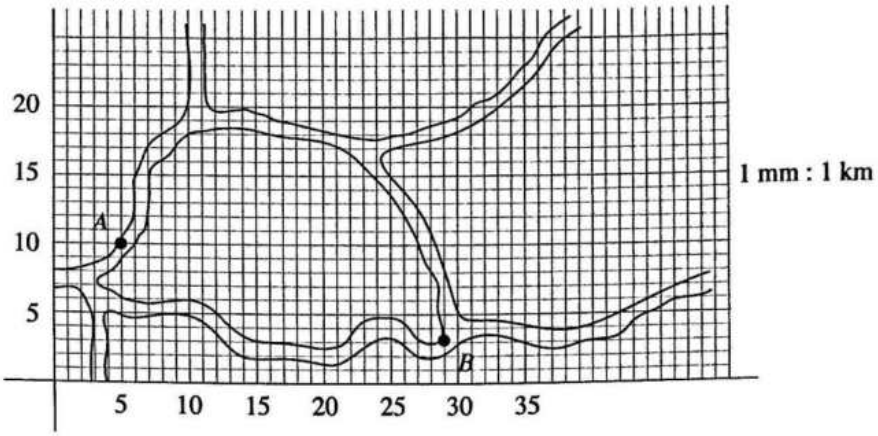
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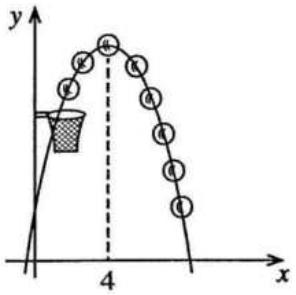
[See page four

21. Use the grid coordinates to find the direct distance between the two marked locations A and B in the following Google map. Consider, a small square here is 1 mm × 1 mm.



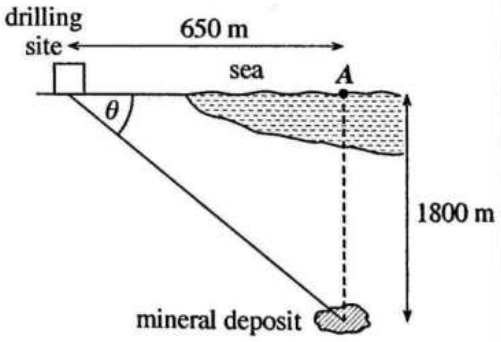
(1) 23 km (2) 24 km (3) 25 km (4) 26 km (5) 27 km

22. The path of the basketball shown in the picture can be modelled by the equation $y = -0.5x^2 + 4x + 2$. If the ball reached the maximum height at $x = 4$ units, this height is



(1) 8 units
(2) 10 units
(3) 16 units
(4) 20 units
(5) 26 units

23. In Pesalai, a mineral deposit is detected at a location 1800 m below the point A in the sea. The nearest drilling site is located 650 m away from A as shown in the diagram. In what angle θ, must the straight drilling path take place to reach the mineral deposit.

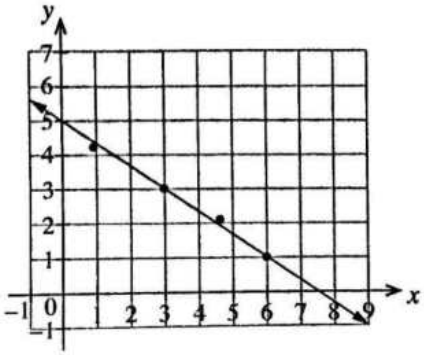


(1) $\tan^{-1}\left(\frac{1800}{650}\right)$ (2) $\tan^{-1}\left(\frac{650}{1800}\right)$

(3) $\sin^{-1}\left(\frac{1800}{650}\right)$ (4) $\cos^{-1}\left(\frac{1800}{650}\right)$

(5) $\cos^{-1}\left(\frac{650}{1800}\right)$

24. Data gathered in an experiment is plotted to identify the relationship between the two variables x and y. Which equation best describes the relationship between the variables?



(1) $y = \frac{2}{3}x + 5$

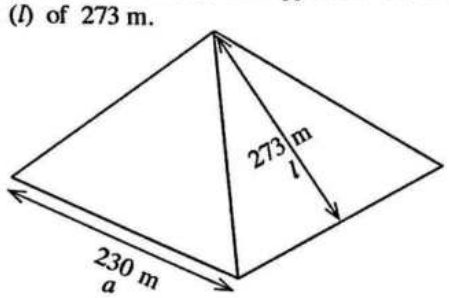
(2) $y = -\frac{2}{3}x + 5$

(3) $y = -\frac{2}{3}x + 7.5$

(4) $y = 1.5x + 5$

(5) $y = -1.5x + 5$

● Questions **25** and **26** are based on the pyramid of Giza in Egypt (shown in the figure) which is one of the Seven Wonders of the World. The pyramid has a square base of side length (a) 230 m and a slant height (l) of 273 m.



25. The vertical height (h) of the pyramid, to the nearest metre (m) is

(1) 147. (2) 225. (3) 248. (4) 296. (5) 357.

26. What formula can be used to calculate the volume (V) of the pyramid?

(1) $V=\left(\frac{a}{2}\right)^2 h$ (2) $V=\frac{1}{3}a^2h$ (3) $V=\frac{1}{3}ahl$ (4) $V=\frac{1}{3}\left(\frac{a}{2}\right)^2 h$ (5) $V=\frac{1}{3}a^2hl$

27. A fair die numbered from 1 to 6 is tossed four times. The variable X is the number of times of the value 6 of the die turns up. The mean and the median of the **all possible values** of X are respectively

(1) 2.0 and 2.0. (2) 2.0 and 2.5. (3) 2.5 and 2.5. (4) 2.5 and 3.5. (5) 3.5 and 3.5.

28. $\sum_{i=1}^{10}(2x_i+5)$ is equal to

(1) $2\sum_{i=1}^{10}x_i+5$ (2) $2\sum_{i=1}^{10}x_i+50$

(3) $20\sum_{i=1}^{10}x_i+5$ (4) $20\sum_{i=1}^{10}x_i+50$

(5) $20\sum_{i=1}^{10}x_i+10$

29. Consider the following statements.

A - Control Unit, Arithmetic and Logic Unit and Memory Registers are the main components of the Central Processing Unit.

B - MS-DOS is an example of a single-user and multi tasking operating system.

C - The capacity of the RAM (Random Access Memory) is an important factor that impacts the efficiency of a computer.

Of the above, the correct statement/s would be

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

30. What is the first step of the booting process of a computer?

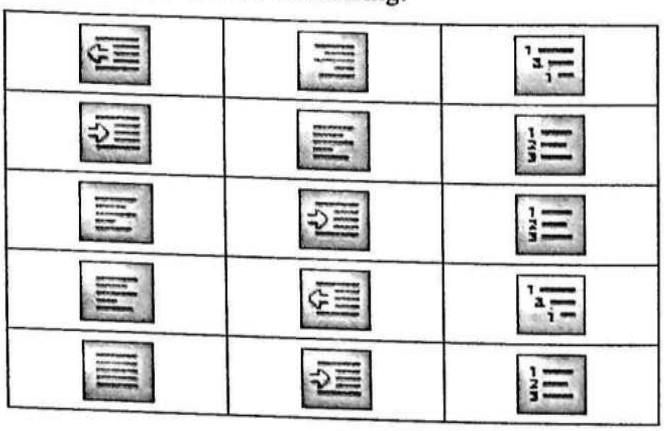
(1) User Test (2) Reliability Test
(3) Integrity Test (4) Correct Functioning Test
(5) Power-On Self Test

31. What tool can be used to insert the author's name at the bottom of every page of a word document?

(1) Header (2) Footer (3) WordArt
(4) Bookmark (5) Comment

[See page six

32. What is the correct order of icons used in a typical word processing software to indicate left align, increase indent and numbering.

(1) 

(2)

(3)

(4)

(5)

33. When a content is larger than a cell size of a spreadsheet, what tool can be used to show all the content within the same cell?

(1) Filter (2) Wrap Text (3) Merge Cells
(4) Text Direction (5) Fill Effect

34. What command can be used to display only the current date in a cell of a spreadsheet?

(1) =Today() (2) =Year() (3) =Date()
(4) =Time() (5) =Now()

35. What is the view in PowerPoint that can be used to see all slides of a presentation at once?

(1) Slide Show (2) Slide View (3) Normal View
(4) Reading View (5) Slide Sorter View

36. What feature in PowerPoint software is used to apply the motion effects when changing from one slide to the next slide?

(1) Slide Insert (2) Slide Design
(3) Slide Transition (4) Animation Objects
(5) Animation Scheme

37. What is the **incorrect** statement?

(1) SMTP is a communication protocol for mail servers to transmit email.
(2) 125.214.169.218 is an example for an IP address.
(3) Google Chrome and Mozilla Firefox are web browsers.
(4) www.doenets.lk is an example for a URL.
(5) HTTP stands for Hypertext Telecommunication Protocol.

38. Consider the following statements regarding cyberbullying.

A - It is the deliberate use of digital technologies to humiliate, harm or harass other people.
B - It can affect mental, emotional or physical wellbeing of a person.
C - It is a crime and laws are available to take actions against it.

Of the above, the correct statement/s would be

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

39. What is the unit of moment of inertia?

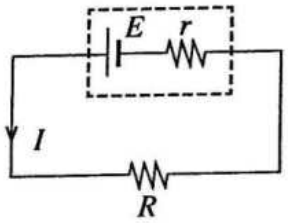
(1) $N m s^2$ (2) $kg m^2$ (3) $kg m$ (4) $J s^2$ (5) $kg^2 m^2$

40. Which one of the following is **not** a vector quantity?
(1) Torque (2) Linear acceleration
(3) Angular acceleration (4) Angular velocity
(5) Angular frequency

41. The angular velocity of a car engine is increased from 800 rpm to 3200 rpm in 15 s at a constant rate. What is its angular acceleration of the engine?
(1) 160 rpm/min (2) 4000 rpm/min (3) 9600 rpm/min
(4) 16000 rpm/min (5) 36000 rpm/min

42. What is the electricity cost for 30 days of a 1.5 kW air conditioner, if it operates for 2 hours per day? (Assume the cost of 1 kWh is 10 rupees)
(1) Rs. 450 (2) Rs. 600 (3) Rs. 900 (4) Rs. 1200 (5) Rs. 1800

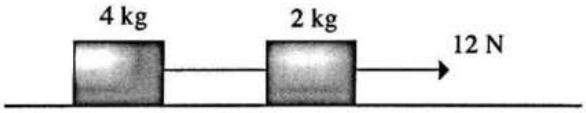
43. A battery (Electro motive force E, internal resistance r) is connected to an external load R as shown in the diagram. The battery delivers a current I through the circuit. Consider the following equations about the voltage (V_R) across the load R.



(A) $V_R = IR$
(B) $V_R = E - Ir$
(C) $V_R = E + Ir$

Of the above, the correct would be
(1) (A) only. (2) (B) only. (3) (C) only.
(4) (A) and (B) only. (5) all (A), (B) and (C).

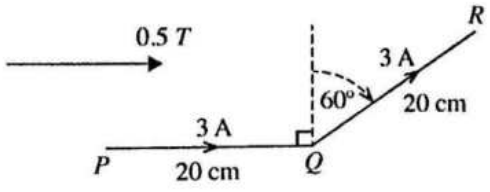
44. Consider two blocks of masses 4 kg and 2 kg placed on a frictionless horizontal surface connected with a light inextensible string as shown in the figure. If the mass 2 kg is pulled horizontally with a force of 12 N, what is the tension on the string?



(1) 2 N (2) 4 N (3) 6 N (4) 8 N (5) 10 N

45. A piece of copper is cooled in a refrigerator and then put in a thermally insulated jug with water at the room temperature. What information is **not** required to calculate the specific heat capacity of copper?
(1) Mass of the water
(2) Mass of the copper
(3) Specific heat capacity of water
(4) Temperature of cooled copper piece
(5) Time taken for the system to reach room temperature

46. A metal wire PQR of 40 cm long is placed in a magnetic field of 0.5 T parallel to PQ segment as shown in the diagram. What is the net force exerted on the wire segment, when current through the wire is 3 A?

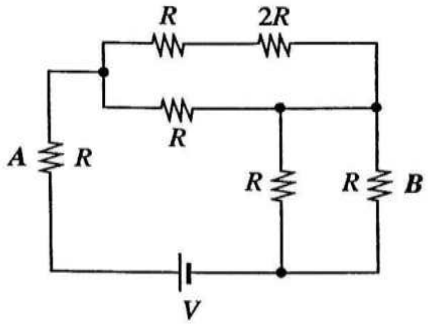


(1) 0.15 N
(2) 0.60 N
(3) 15 N
(4) 45 N
(5) 60 N

θ	30	45	60
sin	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$
cos	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$

[See page eight

47. Six resistors and a battery are connected in a circuit as shown in the diagram. How many times of the power dissipation of resistor A, as power dissipation of resistor B?

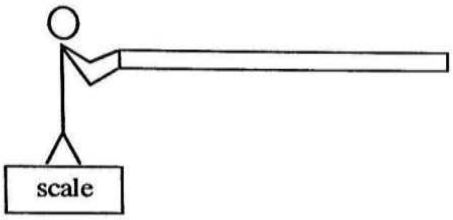


(1) 1 (2) 2 (3) 3 (4) 4 (5) 5

48. The potential energy stored in a light spring is E when stretched by 1 m. What is the potential energy of the spring when the same spring is stretched by 2 m?

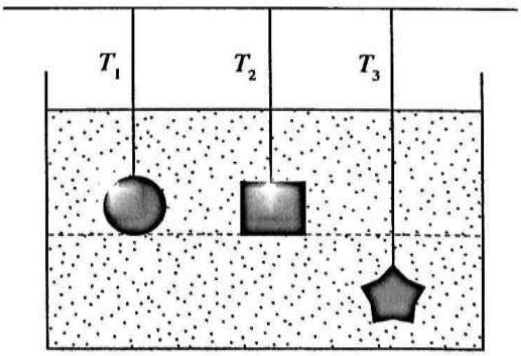
(1) $\frac{E}{2}$ (2) E (3) 2 E (4) 3 E (5) 4 E

49. A man of mass 70 kg is standing in a stable position on a weighing scale while horizontally holding a uniform pole of length of 2 m and mass of 5 kg as shown below. What is the reading of the scale?



(1) 73 kg
(2) 74 kg
(3) 75 kg
(4) 77 kg
(5) 80 kg

50. Three solid blocks each with equal volumes and masses are immersed in a water tank using three light ropes with negligible volumes as shown in the given diagram. What is the correct relationship among the tensions T_1, T_2 and T_3 of these three ropes?



(1) $T_1 = T_2 = T_3$ (2) $T_1 = T_2 > T_3$ (3) $T_1 = T_2 < T_3$ (4) $T_1 < T_2 < T_3$ (5) $T_1 > T_2 > T_3$

* * *