



Saturday April 1, 2017

Time: 10am

Duration: 1 hour 15minutes

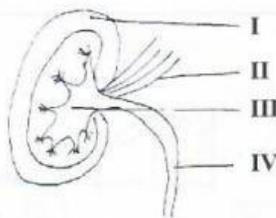
NAME: _____

EXAM NUMBER: _____

INSTRUCTIONS

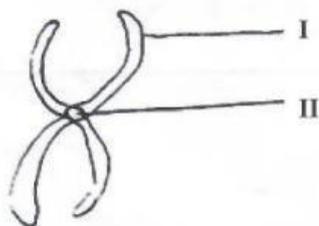
1. DO NOT OPEN THIS BOOKLET UNTIL YOUR INVIGILATOR TELLS YOU.
2. Write your name and exam number on your Question paper; shade same on your OMR sheet.
3. This is a 100 question multiple choice test covering Biology, Chemistry, Physics and Mathematics. Kindly attempt all questions. For each question, only one answer choice is correct.
4. Shade your correct option in the space provided on the SPAK OMR with a 2B or HB pencil.
5. There is no penalty for guessing. Your score is the number of correct answers.
6. Only statistical table is allowed as an aid. Calculators are NOT allowed. No problems on the test require the use of a calculator.
7. Figures/images are not necessarily drawn to scale.
8. You will have 1 hour 15 Minutes to complete the test once your invigilator tells you to begin.
9. When you finish the exam, sign your name & date in the space provided on the OMR sheet.
10. Should there be any incident in your exam room/center, please feel free to email us with relevant information and your details to spaknigeria@gmail.com or send sms to 0907-916-2391.

Carefully study the diagram below and use it to answer questions 1 and 2.



- The diagram represents a/an
 - ear.
 - kidney.
 - liver.
 - spleen.
- The part labeled I is the
 - bile duct.
 - cortex.
 - gall bladder.
 - pinna.

Carefully study the diagram below and use it to answer questions 3 and 4.



- The diagram represents a/an
 - chromosome.
 - golgi body.
 - nucleus.
 - ribosome.
- The part labeled I is the
 - allele.
 - centromere.
 - chromatid.
 - chromatin.

- The Yankari Game Reserve is located in
 - Abuja.
 - Bauchi.
 - Enugu.
 - Sokoto.
- Which of the following is **not** sexually transmitted?
 - Gonorrhoea
 - HIV/AIDS
 - Syphilis
 - Typhoid
- The process by which plants manufacture carbohydrate is called
 - excretion.
 - photosynthesis.
 - reproduction.
 - transpiration.
- A pair of genes that controls a trait is called a/an
 - Allele.
 - Dominant.
 - Hybrid.
 - Recessive.
- Which of the following animals is an invertebrate?
 - Fish
 - Frog
 - Lizard
 - Snail

- Which part of the human body is the thyroid gland located?
 - Chest
 - Head
 - Neck
 - Trunk
- The micro-organism that causes malaria is carried by
 - cockroach.
 - housefly.
 - mosquito.
 - tse tse fly
- Which of these diseases is water-borne?
 - Diabetes
 - Cholera
 - Malaria
 - Measles
- The scientist who postulated the theory of use and dis-use is
 - Charles Darwin.
 - Gregor Mendel.
 - Jean Lamarck.
 - Louis Pasteur.
- Animals that eat only plants are called
 - carnivores.
 - herbivores.
 - omnivores.
 - predators.
- Physiological variations include the following **except**
 - ability to roll the tongue.
 - ability to taste phenylthiocarbamide.
 - behavioural patterns.
 - fingerprints.



- The part labelled III in the diagram above is referred to as
 - claw.
 - coxa.
 - hook.
 - wing.
- Which of the following animals possesses homodont teeth?
 - Lizard
 - Monkey
 - Rabbit
 - Rat
- Which of the following is **not** an excretory product?
 - Faeces
 - Salt
 - Sweat
 - Urine
- Which of the following blood components has affinity for oxygen?
 - Erythrocytes
 - Leucocytes
 - Lymphocytes
 - Thrombocytes

20. The following processes aids transportation in plants **except**
- A. conduction. B. evaporation.
C. osmosis. D. transpiration.
21. The enzyme that acts on starch in the mouth is called
- A. pepsin. B. ptyalin.
C. renin. D. trypsin.
22. Excess glucose in plants is converted to the following substances **except**
- A. cellulose. B. minerals.
C. oils. D. starch.
23. All the following except _____ is **not** a method of asexual reproduction.
- A. budding B. conjugation
C. fission D. grafting
-
24. Which part of the human body is the above diagram located?
- A. Chest B. Hip
C. Shoulder D. Trunk
25. A typical vertebra consists of the following structures **except**
- A. centrum.
B. cervical rib.
C. neural canal.
D. transverse process.
26. Benzaldehyde is similar to aliphatic aldehydes except that benzaldehyde
- A. gives the Schiff reaction.
B. readily oxidizes.
C. forms a bisulphite compound.
D. readily polymerises.
27. In which of the following equation does hydrogen sulphide behave as an acid?
- A. $2\text{FeCl}_3 + \text{H}_2\text{S} \rightarrow 2\text{FeCl}_2 + 2\text{HCl} + \text{S}$
B. $\text{H}_2\text{SO}_4 + \text{H}_2\text{S} \rightarrow \text{SO}_2 + 2\text{H}_2\text{O} + \text{S}$
C. $2\text{NaOH} + \text{H}_2\text{S} \rightarrow \text{Na}_2\text{S} + 2\text{H}_2\text{O}$
D. $\text{SO}_2 + 2\text{H}_2\text{S} \rightarrow 2\text{H}_2\text{O} + 3\text{S}$
28. The following are uses of sulphur **except**
- A. manufacture of tetraoxosulphate (VI) acid.
B. manufacture of inorganic fertilizers.
C. preparation of fungicides and insecticides.
D. vulcanization of rubber.



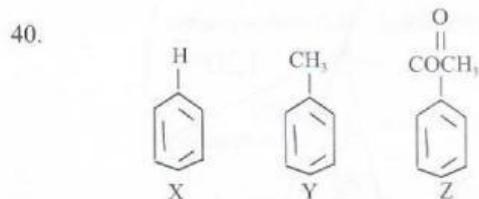
- What is the name of the compound above?
- A. 3,7,11,15 - tetramethylhexanoic acid
B. 3,7,11,15 - tetramethyldecanoic acid
C. 3,7,11,15 - tetramethylhexadecanoic acid
D. 3,7,11,15 - tetramethyldecahexanoic acid

30. What is the molecular formula of an hydrocarbon with molecular mass 3, containing 0.12mole of carbon and 0.36mole of hydrogen?
- A. CH_2 B. CH_3
C. C_2H_4 D. C_2H_6
31. An empty flask weighed 50.10g and 50.40g when filled with hydrogen. Calculate its mass in grams when filled with sulphur dioxide under the same conditions. [$\text{SO}_2 = 64$]
- A. 9.6 B. 50.1
C. 50.4 D. 59.7
32. If the density of a saturated solution of salt X is 2.0gcm^{-3} , calculate the solubility in mol dm^{-3} [Relative molecular mass of X = 60gmol^{-1}]
- A. 30 B. 33
C. 58 D. 62
33. Calculate the number of moles of CaCl_2 that can be obtained from 15g of CaCO_3 in excess HCl. (Ca = 40, C = 12, O = 16)
- A. 0.15 B. 6.67
C. 85 D. 115
34. What quantity of electricity in coulombs was passed when 5 amperes was consumed in 10 seconds during electrolysis?
- A. 2 B. 5
C. 15 D. 50
35. Which of the following is a condition for a spontaneous reaction?
- A. $\Delta H - T\Delta S$ is positive
B. $\Delta H - T\Delta S$ is negative
C. $\Delta H - T\Delta S$ is zero
D. ΔS is zero
36. Equilibrium is said to be attained in a reversible reaction when
- A. all the reactants have been used up.
B. the rate of formation of the products decreases with time.
C. the rates of the forward and backward reactions are equal.
D. there is no further change in temperature.

37. The following are causes of environmental pollution **except**
- A. bush burning. B. chemical warfare.
C. industrialization. D. planting of trees.

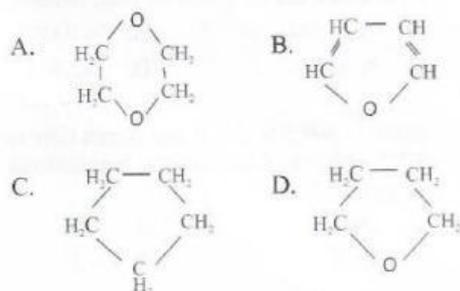
38. How many chiral centres are present in glucose molecule?
- A. 6 B. 5
C. 4 D. 2

39. An example of soapless detergent is
- A. $\text{CH}_3\text{COOCH}_2\text{CH}_3$ B. $\text{C}_2\text{H}_5\text{COOCaH}_5$
C. $\text{C}_{12}\text{H}_{25}\text{OSO}_3\text{Na}$ D. $\text{C}_{17}\text{H}_{35}\text{COONa}$.

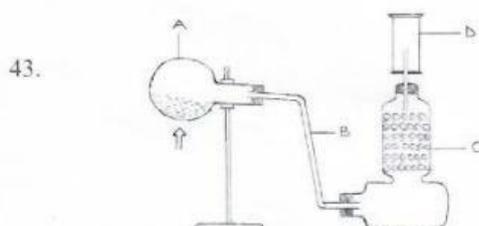


The compounds above can be arranged in order of increasing reactivity towards electrophilic aromatic substitution as

- A. $X < Y < Z$. B. $X < Z < Y$.
C. $Y < X < Z$. D. $Z < X < Y$.
41. The unsaturated cyclic ether furan can be made from substances isolated from oat hulls and corn cobs. Which of these is **not** a form of furan?



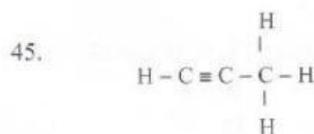
42. The percentage by mass of sodium in anhydrous sodium tetraoxosulphate (VI) is
[Na = 23, S = 32, O = 16]
- A. 23.0% B. 32.4%
C. 46.0% D. 64.2%



The diagram above represents the laboratory preparation of ammonia. The part labelled C is the

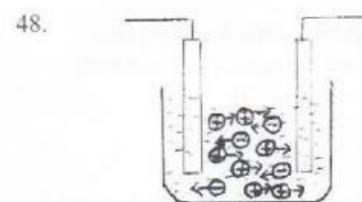
- A. compressor. B. catalytic chamber.
C. condenser. D. drying tower.

44. Calculate the mass in grams of sulphur (VI) oxide which will react with water to form 4.9g of pure tetraoxosulphate (VI) acid.
[S = 32, O = 16, H = 1]
- A. 2 B. 4
C. 6 D. 8



In the compound above, how many π bonds are present in the triple bond?

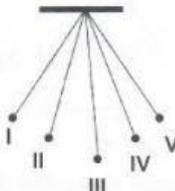
- A. 2 B. 3
C. 4 D. 5
46. Calculate the ΔH in Jmol^{-1} of an equilibrium system whose entropy is $218.2 \text{ Jk}^{-1}\text{mol}^{-1}$ at 100°C .
- A. 2.182 B. 21820
C. 40694.3 D. 81388.6
47. A gas occupies 70dm^3 at s. t. p. What volume in dm^3 would it occupy at 22°C and 945 mmHg?
- A. 52.1 B. 60.8
C. 63.9 D. 65.8



What is the name of the pole that the negative ions in the diagram above migrate to?

- A. Anode B. Cathode
C. Electrode D. Salt bridge
49. Calculate the pH value of hydrochloric acid solution containing 0.01 mol dm^{-3} of hydrogen ions.
- A. 0.1 B. 1.0
C. 2.0 D. 10.0
50. Calculate the mass of oxygen in grams formed when 0.01 mol of potassium chlorate is heated.
 $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$
[K = 39, O = 16, Cl = 35.5]
- A. 0.38 B. 0.40
C. 0.48 D. 0.59

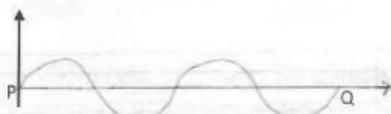
51. A body is under the action of two forces of magnitudes 4N and 3N at right angle to each other. Calculate the resultant of the forces.
- A. 1N B. 5N
C. 7N D. 12N

52. A car starts from rest and accelerates uniformly for 2s to cover a distance of 3m. Calculate the acceleration of the car.
 A. 9.0ms^{-2} B. 3.0ms^{-2}
 C. 1.5ms^{-2} D. 0.8ms^{-2}
53. At what angle to the horizontal should a stone be projected to attain maximum range?
 A. 30° B. 45°
 C. 55° D. 60°
54. A stone is projected with an initial velocity of 60ms^{-1} at an angle of 30° to the horizontal, calculate the time of flight. [$g = 10\text{ms}^{-2}$]
 A. 12.0s B. 6.0s
 C. 3.0s D. 1.5s
55. A uniform metre rule balances horizontally on a knife edge at the 25cm mark, when a mass of 30g is hung at the 10cm mark. Calculate the mass of the ruler.
 A. 30g B. 18g
 C. 12g D. 6g
56. Which of the following is an example of a body in an unstable equilibrium?
 A. Ball in a bowl
 B. Cone resting on its side
 C. Cylinder lying on its side
 D. Egg on an inverted spherical bowl
57. The diagram below represents various positions of a swinging pendulum bob.
- 
- At what position(s) of the bob is the potential energy maximum?
 A. I only B. III only
 C. I and V only D. II and IV only
58. An oscillating simple pendulum makes 10 complete oscillations in 20s. Calculate the length of the string. [$g = 10\text{ms}^{-2}$]
 A. $10/\pi$ B. $10/\pi^2$
 C. $5/\pi$ D. $5/\pi^2$
59. A ball experienced an impulse of 30Ns when hit by an object with a force of 60N. For how long did the force act on the ball?
 A. 0.5s B. 2.0s
 C. 30.0s D. 1800.0s
60. A man standing in an elevator will feel weightless when the elevator
 A. accelerates upwards.
 B. falls freely.
 C. is stationary.
 D. moves with constant velocity.
61. A spring is stretched by 0.1m when a force of 20N is applied to it. Calculate the elastic potential energy of the spring.
 A. 1.0J B. 0.1J
 C. 2.0J D. 20.0J
62. The ice and steam points on a thermometer are 90mm apart. At what distance above the ice point mark will it read a temperature corresponding to 40° on the Celsius scale?
 A. 54.0mm B. 50.0mm
 C. 44.4mm D. 36.0mm
63. Which of the following processes takes place at any temperature?
 A. Boiling B. Evaporation
 C. Freezing D. Melting
64. Calculate the quantity of heat required to raise the temperature of $2.0 \times 10^3\text{kg}$ of water at 40°C to its boiling point. [specific heat capacity of water = $4.2 \times 10^3\text{Jkg}^{-1}\text{K}^{-1}$]
 A. 840J B. 504J
 C. 336J D. 8.4J
65. The instrument for measuring gas pressure is called
 A. altimeter. B. barometer.
 C. hygrometer. D. manometer.
66. The change in velocity of a wave as it crosses the boundary between two media of different densities is known as
 A. diffraction. B. interference.
 C. reflection. D. refraction.
67. A fixed mass of gas at 300K has a volume of 400cm^3 . If it is heated to 360K at constant pressure, calculate its new volume.
 A. 80cm^3 B. 270cm^3
 C. 333cm^3 D. 480cm^3
68. An object is placed at 20cm in front of a concave mirror of radius of curvature 30cm. Calculate the distance of its image from the mirror.
 A. 8.6cm B. 20.0cm
 C. 30.0cm D. 60.0cm
69. How many images will be formed when two mirrors are placed at an angle of 180° to each other?
 A. 4 B. 3
 C. 2 D. 1
70. A glass cube of length 5cm has a mass of 300g. Calculate its density.
 A. 0.4gcm^{-3} B. 1.5gcm^{-3}
 C. 2.4gcm^{-3} D. 12.0gcm^{-3}
71. Which of the following frequency range of sound is used to determine sea depth?
 A. Audio B. Infrasonic
 C. Supersonic D. Ultrasonic

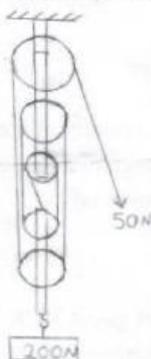
72. Which of the following sets of media is arranged in order of increasing speed of sound in them?
- Water, iron and air
 - Iron, water and air
 - Iron, air and water
 - Air, water and iron

73. A coin was viewed through a 3cm thick glass block and observed to be 2cm below the surface. Calculate the refractive index of the glass.
- 5.0
 - 1.5
 - 1.0
 - 0.7

74. The wave form below represents energy transferred from P to Q in 4.5×10^{-3} s. Calculate the period of the wave.



- 1.13×10^{-3} s
 - 2.25×10^{-3} s
 - 4.44×10^{-4} s
 - 8.89×10^{-4} s
75. Calculate the mechanical advantage of the pulley system represented by the diagram below?



- 0.25
 - 4.00
 - 5.02
 - 40.00
76. Evaluate $\frac{\log_2 8}{\log_2 \frac{1}{4}}$
- $-\frac{3}{2}$
 - $-\frac{2}{3}$
 - $-\frac{1}{2}$
 - $\frac{3}{2}$
77. Reduce 93 to its simplest form in modulo 5.
- 5 (mod 5)
 - 4 (mod 5)
 - 3 (mod 5)
 - 2 (mod 5)
78. If $x \propto y$ and $y^2 \propto Z^3$, how does x vary with Z ?
- $x \propto Z^4$
 - $x \propto Z^3$
 - $x \propto Z^2$
 - $x \propto Z$

79. The time t taken to travel to a given distance varies inversely with the speed s . If $t = 3$ when $s = 6$, find t in terms of s .
- $t = 18s$
 - $t = 2s$
 - $t = 18/s$
 - $t = 1/2s$

80. Given that $P \propto \frac{Q}{R^2}$, where $Q = R = 2$, $P = 1$, find P when $Q = R = 1$.
- 2
 - 4
 - 6
 - 7

81. Given the statements:
 p: All state capitals are big cities.
 q: Ibadan is a state capital.
 Which of the following statements is true?
- All big cities are state capitals
 - All state capitals are not big cities
 - Ibadan is not a state capital
 - Ibadan is a big city

82. Solve the equation $x = \frac{21}{x+4}$
- $x = -4$ or 7
 - $x = -3$ or 7
 - $x = 3$ or -7
 - $x = 3$ or 7

83. If $2^{(x-y)} = 8$ and $2^{(x+y)} = 128$, find x
- 10
 - 7
 - 5
 - 4

84. Simplify $\frac{(8a^2b)^3 \cdot a^2b^2}{(2a^2b)^4 \cdot a^2b^2}$
- $8a^2b^2$
 - $8a^2b$
 - $8a^2b^2$
 - $8a^2b^2$

85. From the diagram above find the value of x and y .
- $x = 2, y = -1$
 - $x = 2, y = 1$
 - $x = -2, y = -1$
 - $x = -2, y = 1$

86. In ΔABC , $a = 5$ m, $c = 2$ m and $B = 57.7^\circ$, calculate b to the nearest whole number.
- 3m
 - 4m
 - 5m
 - 6m

87. What is the value of x and θ from the diagram below?
-
- 6.2cm, 41.8°
 - 8.3cm, 50.2°
 - 8.9cm, 41.8°
 - 12.3cm, 60°

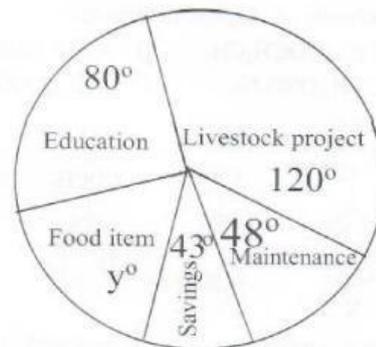
88. In the figure below, if the mean mark of the distribution is 4, find the value of k .

| | | | | | |
|-------|---|-----|---|---|---|
| Marks | 5 | k | 1 | 4 | 3 |
| Freq. | 2 | 5 | 4 | 3 | 5 |

- A. 6
C. 8
- B. 7
D. 9
89. Find the mean deviation of 8, 6, 10 and 12.
A. 2
C. 6
- B. 4
D. 9
90. Given that $\sqrt{2y - x} = 6$, find its gradient.
A. $x - 6$
C. $x + 9$
- B. $x + 6$
D. $2x - 9$
91. 4 men and 6 women boarded a bus at the bus station. What is the probability that the first person to disembark would be a woman?
A. $\frac{1}{6}$
C. $\frac{1}{4}$
- B. $\frac{1}{5}$
D. $\frac{3}{5}$
92. Which of the option below is equivalent to (p,r,e,m,i,s,e)?
A. (p,r,o,m,i,s,e)
C. (n,u,m,b,e,r)
- B. (p,r,i,m,e)
D. (n,u,m,b)
93. Two positive numbers differ by 7 and their product is 60. Find the sum of the numbers.
A. 5
C. 12
- B. 7
D. 17
94. The ages of 5 pupils in years are 7, 5, 6, 8 and 9. Find the mean age.
A. 5 years
C. 7 years
- B. 6 years
D. 10 years
95. If the locus of the points which are equidistant from points P and Q meet the line PQ at point N, then PN equals
A. $\frac{1}{4}NQ$
C. NQ
- B. $\frac{1}{2}NQ$
D. 2NQ

96. Find the area of a sector of a circle of radius 5cm which subtends an angle of 30° at the centre.
A. 3.66cm^2
C. 6.55cm^2
- B. 5.32cm^2
D. 8.31cm^2

The monthly salary of Mr. Umar for year 1999 was N24,000.00. His expenditure are on livestock project, education of children, food item, savings and motor cycle maintenance as shown in the pie chart below.



Use the above information to answer questions 97 and 98.

97. What is the difference between the amounts spent on livestock project and food items?
A. N5,000
C. N 4,600
- B. N 8,000
D. N 3,400
98. How much did he spend on food items?
A. N 15,000
C. N 4,600
- B. N 8,000
D. N2,400
99. Ilorin is at 9.5°N , 5.7°E and Benin City is at 9.5°N , 15.2°W . Calculate the longitudinal distance.
A. 20.9°
C. 15.2°
- B. 10.5°
D. 6.3°
100. A bag contains 5 black, 4 white and x red marbles. If the probability of picking a red marble is $\frac{2}{5}$, find the value of x .
A. 4
C. 8
- B. 6
D. 10



The SPAK National Science Competition is a unique initiative, developed to identify, promote and reward outstanding secondary school science students in Nigeria. It is strictly for SS2 (year 11) students between the ages of 14-17 years.

SPAK is a mix of education, entertainment and technology which fits into the drive for excellence and innovations. The intention is to encourage students to pick up interest in sciences by creating the right ambience that would stimulate their performance with a key message of increasing the interest of Student, Parents, Teachers and other key stakeholders in Nigeria. Participation on SPAK is FREE for all.

SPAK OBJECTIVES

1. To promote the right support and reward for Science students in Nigeria.
2. To re-awaken and encourage the study of science in Secondary schools in Nigeria.
3. To identify and recognize outstanding students with educational grants.

THE SPAK PROJECT

There are two main levels of the competition.

FIRST ROUND: WRITTEN QUALIFYING EXAMINATION

In this stage, all the students' registered online (i.e. the best SIX (6) from each registered school) will write a National qualifying examination conducted by NECO at designated centers across Nigeria including FCT, Abuja.

PLEASE NOTE

1. Students are advised to check their results via the online platform that will be made available to them from May 1st 2017.
2. Only qualified (best 81) students will be contacted for the second stage (TV quiz) of the competition.
3. The SPAK National Science Competition will be televised on major TV/Media Networks and on Social media from October 2017.

SECOND ROUND: TV QUIZ COMPETITION

The best 81 students (with the highest scores) out of those who wrote the qualifying examination will be invited to participate at this stage of the competition. This will be recorded and transmitted on Television across Nigeria and Africa.

All students who make it to the second round (TV quiz competition stage) would get plaques, certificate of participation and educational grants amongst other things:

| | | |
|--|---|-------------------|
| 1 st Position | - | 250,000 Naira |
| 2 nd Position | - | 150,000 Naira |
| 3 rd Position | - | 100,000 Naira |
| 4 th - 5 th Position | - | 60,000 Naira each |
| 6 th - 9 th Position | - | 50,000 Naira each |
| 10 th - 27 th Position | - | 30,000 Naira each |
| 28 th - 81 st Position | - | 20,000 Naira each |

SECOND ROUND: RULES & REGULATIONS

1. All qualified students SHOULD prepare to take questions from Physics, Chemistry, Biology, Mathematics, ICT, Civic Education, and General Knowledge based on the current SS2 WAEC/NECO syllabuses.
2. The decision of the organizers/ NECO is final and we shall not enter into any correspondence with anyone regarding the conduct of this examination.