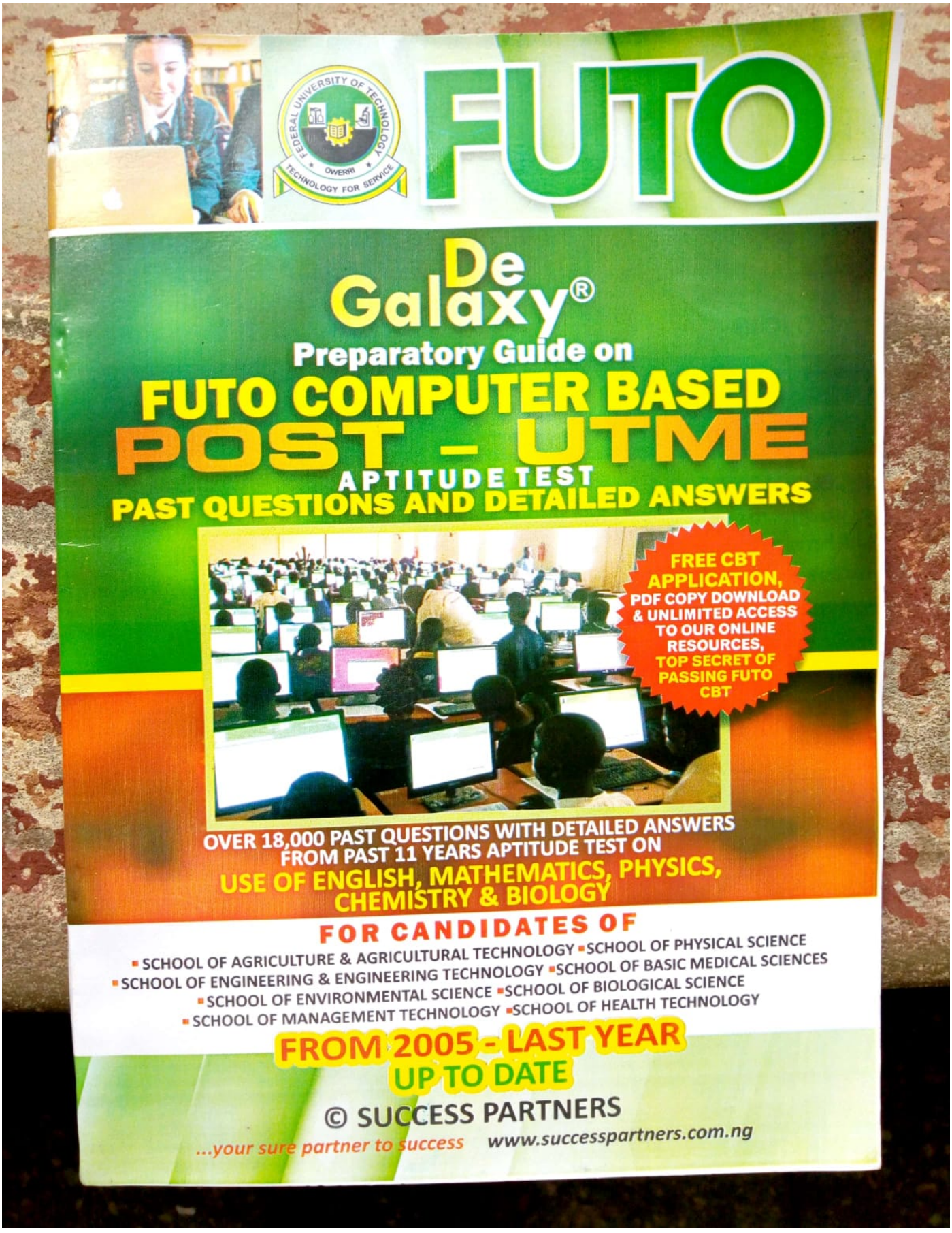

FOREWORD

There is no royal road to learning, no shortcut to the acquisition of any valuable art. Indeed, the truthfulness of those words of Anthony Trollope can be seen in the series of stepwise hurdles in the quest for knowledge acquisition. Welcome to this great stage. As you endeavor to acquire the studentship of this prestigious citadel of learning, one important hurdle you have to overcome is the CBT POST – UTME. In this publication, thorough insight is given to the essential secrets of excelling in this examination. These are outlined in the form of:

- Understanding the **FUTO CBT POST-UTME**
- Tested and proven preparatory techniques
- 14 years past questions and detailed solutions for all school in FUTO
- Overcoming fears of failing exams
- Helpful memory tips

WORDS ON TABLOID

1. Always be in motion, but with a direction in mind.
2. While the world might look at you as empty vessel to be filled, you are indeed candles to be lit.
3. As you transit to this next great scene, remember that there are no small roles, only small minded people…

Success Partners acknowledges the Federal University of Technology, Owerri for allowing access to their past questions. We say thank you.

UNDERSTANDING THE FUTO POST UTME

Over the last fourteen years, the POST UTME has been an integral part of the admission process. As the name implies, it is indeed a screening process in which various strategies had been employed to ensure that candidates fail to meet up with the process. In this article we, have intricately x-rayed the various ups and downs inherent, it is thus timely to understand this screening process especially now that it is CBT.

NATURE OF THE COMPUTER BASED TEST

As observed in the previous exercise, subjects taken not limited to the candidate's specialty. A set of 25 Questions, 5 each from English, Mathematics, Physics, Chemistry and Biology. However, this questions are generated from data base containing questions from past FUTO Post UTME, JAMB, WASSCE, A/O Level text books practice questions on each subjects. As such two candidates may likely write not exactly the same questions.

THE SECRET OF PASSING FUTO CBT POST UTME TEST

Over years the three science subject in addition to English and Mathematics have formed a useful part of the questions. i.e . Physics, Chemistry and Biology. However, "you must capitalize on your strength to suffice for your weakness."

This implies that you have to solve the subjects' areas you are particularly good at first, before moving on to the other ones. Additionally, **do not leave one number vacant.** Leaving a vacant option implies that you stand no chance of making right answer out of it. However, making educated and intelligent elimination is advisable. This means cancelling out the options you are most familiar with, leaving a seeming right answer.

Also note that some questions are time killers. The following keys might be very helpful.

Always read questions together with their options. Click on answers you are convinced of and in case of unfamiliar questions you can do intelligent guessing or elimination method of likely odd ones. Other helpful tips include: ensure you are present at examination venue on time possibly 2–3 hrs before your exam time. Prepare for the stress of checking in by eating very well. Make sure some days before the exam that you do not engage in activities that will affect your hands because of the biometric checks. Keep track of time. Use simpler question to gain time.

Read instruction thoroughly and pray and trust in Jehovah implicitly, he will not let you totter.

SUCCESS IS ASSURED!!!

REQUIREMENTS FOR THE SCREENING

Candidates for the screening should come with the following: Two clear copies (with clear pictures of the printout of the completed online registration form, & UTME result slip and photocopy of payment slip / e- transact used for registration. Also come along with pen /pencil for your rough work.

WARNING!!!

GSM Phones, Calculators and other Electronic Devices are not allowed into the venue.

To succeed you must learn to rise above your fears!

2018/2019 FUTO POST UTME COMPUTER BASED TEST

FOR ALL CANDIDATES: SEET, SOPS, SOBS, SOES, SAAT, SMAT, SOHT, SBMS, SCIT

CLICK ENTER (TO BEGIN YOUR TEST)

ENTER REGISTRATION NUMBER (CLICK SUBMIT)

Instruction for Candidates

This exam last for 30mins, you have five (5) subjects to answer. Attempt all questions before the time elapses. You can either use the cursor (mouse) or the keyboard for the exam. Click on the right option and click on submit, when you are done.

N/B. Exam malpractice is a serious offence and it attracts severe penalties when caught, avoid it for your own good.

ENGLISH | MATHEMATICS | CHEMISTRY | PHYSICS | BIOLOGY

We advise you to start with subjects without calculations to ones with calculations to save time

ENGLISH LANGUAGE

1. "My father has many mouths to fed" is an example of which figure of speech.
   (a) metaphor (b) hyperbole (c) synecdoche (d) metonymy (e) epigram
2. He was appalled by the news. (a) pleased immensely (b) displeased (c) shocked deeply
   (d) saddened (e) thoroughly confused
3. The following are elements/ features of pose except (a)plot (b)theme (c) setting
   (d) enjambment (e)characterization
4. The lexical relationship between "cite" and "sight" is that
   (a) autonymy (b) synonym (c) hyponymy (d) hoponymy (e) homonymy

Choose the option which has the same consonant sound as the one represented by the letter(s) underlined

5. You (a) yes (b) union (c) yawn (d) all of the above (e) none of the above

ANSWERS TO ENGLISH LANGUAGE QUESTIONS

1. C - synecdoche 2. A - pleased immensely 3. D - enjambment 4.C.- hyponymy 5. B - union

BIOLOGY

1. Which of the under listed bears histone protein?
   (a) plasmalema (b) chromosome (c) lysosome (d) endoplasmic reticulum (e) DNA
2. The polymers of lipids are linked by (a) glycosidic bond (b) peptide bond
   (c) neutral covalent bond (d) electrovalent bond (e) hydrogen bond

3. The following are edaphic factors except
   (a) salinity (b) topography (c) water current (d) light intensity (e) pH
4. African sleeping sickness is caused by
   (a) balatidiunmb coil (b) paramecium (c) vibrio cholerate (d) trypanosome gambeiense (e) amoeba
5. Powerhouse of the cell is
   (a) mitochondria (b) dictyosome (c) ribosome (d) centriole (e) none of the following

ANSWERS TO QUESTIONS ON BIOLOGY

1. E. - DNA **2. E** - hydrogen bond **3. D**- light intensity **4. D** - trypanosome gambeiense
5. A – mitochondria

PHYSICS

1. If A,B and θ are 4,3 and 45^0 respectively. Calculate $|A\ x\ B|$.
   (A) 4 (B) 3 (C) 7.5 (D) 8.5 (E)9.5
2. The wavelength of the first overtone of a note in a closed pipe of length 33cm is
   A. 17cm B. 22cm C. 44cm D.33cm E. 11cm
3. A ball is kicked at angle of 37^0 with the horizontal with an initial speed of $15.2ms^{-1}$. What is the range?
   (A) 0.93m (B) 4.24m (C) 1.86 (D) 22.62m (E) -4.24m
4. If the refractive index of a medium is 2, what is its critical angle?
   (A).45^0 (B).30^0 (C). 60^0 (D). 25^0 (E). 15^0
5. Calculate the work done on a capacitor of capacitance $200\mu F$, when a potential difference of 1KV is applied.
   (A) 10KJ (B) 10J (C) 1KJ (D) 100J (E) 100KJ

DETAILED ANSWERS TO PHYSICS QUESTIONS

1. $|A\ x\ B| = |A\ //B|\ \sin\theta$; $|A\ x\ B| = 4\ x\ 3\sin 45 = 12 in45 \Longrightarrow 12\ x\ 0.7071$
   $|A\ x\ B| = 8.48 \cong 8.5$ ----------D
2. recall $L=\frac{3\lambda}{4} \Rightarrow 33=\frac{3\lambda}{4}$ $\therefore \lambda = \frac{4\ x\ 33}{3}$; $\lambda = 44\ cm$ ---------(C)
3. $\theta = 37^0$, $V = 15.2ms^{-1}$; $Range = \frac{V^2 sin2\theta}{g} = \frac{(15.2)^2 sin2(37)}{9.8} = \frac{231.04 sin74}{9.81}$
   $= \frac{222.09}{9.81} = 22.62m$ ------D
4. 45^0C ----------(A)
5. Work done capacitor, E=? ; Capacitance =200m F , Potential difference=1kv ;
   $E=\frac{1}{2}CV^2 = \frac{1}{2}x\ 200\ x\ (1)^2 =$ 100kJ------E

CHEMISTRY

1. The reaction between an alkali and a fat to form soap is known as
   (a) double decomposition (b) neutralization (c) saponification (d) polymerization (e) hydrogenation
2. The ratio of the number of molecules in 2g of hydrogen to that in 16g of oxygen is
   A. 2:1 B. 1:1 C. 1:2 D. 1:4 E. 1:8
3. If an organic compound decolorizes bromine water then the compound is
   a. Saturated b. Super saturated c. Unsaturated d. Solid e. Protonated
4. If the vapour density of a gas is 15. What is it's relative molecular mass?
   (a) 20 (b) 10 (c) 40 (d) 30 (e) 60
5. How many grams of Ca must react with 41.5g of Cl to produce $CaCl_2$?
   (a) 13g (b) 20.75g (c) 83g (d) 33g (e) 23g

ANSWERS TO CHEMISTRY QUESTIONS

1. E - hydrogenation
2. $\frac{2}{16} = 1:8$ ----------(E)
3. C - Unsaturated
4. V.D = ½ R.M.M
   $\therefore 2 \times 15 = 30$—D

5. $C_a + 2Cl \longrightarrow CaCl_2$; $40gCa$ will react with $2(35.5)g\ Cl$

   $xgCa$ will react with 41.5gCl ; $x = \frac{41.5 \times 40}{71} = 23.38 \cong 23g\ Ca$ ----------E

MATHEMATICS

1. The difference between $\frac{1}{3}$ of 0.093 and $\frac{3}{5}$ of 1.055 is divided by $\frac{5}{8}$. The result is
   (a) 0.936 (b) 1.936 (c) 1.963 (d) 0.963 (e) 1.988
2. If a< b and c = 0, it is true that (a) ac=bc (b) ac< bc (c) ac>bc (d) a-b=c (e) $ac<c^2$
3. Expressed in its simplest form $\sqrt{50} + \sqrt{2} - 2\sqrt{18} + \sqrt{8}$ is
   (a) $3\sqrt{2}$ (b) $5\sqrt{2}$ (c)$6\sqrt{2}$ (d) $8\sqrt{2}$ (e) $2\sqrt{2}$
4. The set of values of x and y which satisfy the equations x + y = 7 and x – y = 1 also satisfy the equation. (a) x + y = 8 (b) 2x + y = 10 (c) x + 2y = 11 (d) 2x – y = 5 (e) x + y = 0
5. Solve the equation $\log_{10}(x^2 - 5x + 94) = 2$
   (a) -1, 6 (b) 1, 3 (c) 6, 1 (d) 1, -6 (e) none of the above

DETAILED SOLUTIONS TO MATHEMATICS QUESTIONS

1. $\frac{1}{3}x\ 0.093 = 0.031$; $\frac{3}{5}\ x\ 1.055 = 0.633$;
   $\frac{0.602}{5/8} = \frac{0.602}{0.625} = 0.9632$ ----D
2. If a<b = ac = bc ;
   $C = O = a \times O = b \times 0 \Rightarrow o = 0$ *which is true* —A
3. $\sqrt{50} + \sqrt{2} - 2\sqrt{18} + \sqrt{8}$;
   $\sqrt{25 \times 2} + \sqrt{2} - 2\sqrt{9 \times 2} + \sqrt{4 \times 2}$;
   $5\sqrt{2} + \sqrt{2} - 6\sqrt{2} + 2\sqrt{2}$;
   $= 2\sqrt{2}$ ----------E
4. X + y = 7----------(i) x-y = 1----------(ii) from (i) x=7-y
   - putting value of x into (ii) 7-y-y = 1 $\Rightarrow 7 - 2y = 1$; $2y = 7 - 1$; $y = {}^{6}/_{2} = 3$

   $x = 7 - 3 = 4$; Hence 2x-y = 5 ; 2(4)-3 = 5 $\Rightarrow 5 = 5$ is correct -------D
5. $\log_{10}(x^2 - 5x + 94) = 2 \Rightarrow x^2\text{-}5x - 6 = 0$
   $\Rightarrow (x^2 - 6x) + (x - 6)$
   $\Rightarrow x(x - 6) + 1(x - 6) \Rightarrow (x + 1)(x - 6) = 0$
   $\Rightarrow -1\ or\ x = 6$ ---------A

2017/2018 FUTO POST UTME COMPUTER BASED TEST

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ENGLISH | MATHEMATICS | CHEMISTRY | PHYSICS | BIOLOGY

We advise you to start with subjects without calculations to ones with calculations to save time

ENGLISH LANGUAGE

1. When a word conveys not only one meaning but also the user's emotion, we say the word is
   [A] literal [B]Connotative [C] denotative [D] collocative [E] Erymological

2. Uchenna decided to make a clean breast of everything. This means that Uchenna
   [A] adopted clean habits [B] denied any knowledge of the matter [C] told the whole truth [D] remained firm in his earlier decision [E] remained silent about everything

3. "Death, where is they sting" is an example of _____
   [A] paradox [B] simile [C] metaphor [D] euphemism [E] climax

Choose the option which has the same vowel sound as the represent by the letter (s) underlined

4. Fail [A] Cut [B] abode [C] tame [D] pass [E] right

5. When our purpose for reading is to search for a specific piece of information, we adopt one of the following techniques [A] skimming [B] SQQ3R [C] Scanning [D] extensive reading [E] intensive reading

ANSWERS TO QUESTIONS ON ENGLISH LANGUAGE

1 .B -Connotative 2. C - told the whole truth 3. D - euphemism 4. E - bankrupt 5. C - scanning

To succeed you must learn to rise above your fears!

BIOLOGY

1. Regulation of blood sugar level takes place in the
   [A] pancreas [B] ileum [C] liver [D] kidney.
2. Unicellular organisms transport essential nutrients directly to all parts of their bodies by the process of diffusion because they have [A] a large volume to surface area ratio [B] a large surface area to volume ratio [C] their bodies immersed in the nutrients [D] their outer membrane made of cellulose.
3. Which of the following structures is capable of producing more tissues in the stem of a herbaceous flowering plant? [A] Epidermis [B] pericycle [C] xylem [D] cambium.
4. Which of the following movements occur during exhalation? [A] the diaphragm and intercostals muscles relax [B] the thoracic cavity increases in volume [C] the diaphragm and intercostal muscles contrast [D]the diaphragm contrast and the intercostals muscles relax.
5. The manufacture of carbohydrates by plants takes place only in
   [A] the leaves [B] the green stems [C] chlorophyllus parts [D] Flowering plants.

ANSWERS TO QUESTIONS ON BIOLOGY

1. C – Liver 2. B – a large surface area to volume ratio 3. D – Cambium 4. D - the diaphragm contracts and intercostals muscles relax 5.C – Chlorophylluos parts

CHEMISTRY

1. What volume of 1.dm hydrochloric acid must be diluted to obtain $1dm^3$ of 0.05m acid?
   [A] $4.54cm^3$ [B] $5.65cm^3$ [C]$6.76cm^3$ [D] $7.87cm^3$

2. The Avogadro number of 24g of magnesium is the same as that of [A] 1g of hydrogen molecules [B] 16g of oxygen molecules [C] 12g of carbon molecule [D] 35.5g of chlorine molecules

3. Which of the following is a physical change?
   [A] the bubbling of chlorine into water [B] the bubbling of chorine into a jar containing hydrogen [C] the dissolution of sodium chloride in water [D] the passing of steam over heated iron.

4. If gas occupies a container of volume $146m^3$at 10^0C and 0.971 atm, its volume in cm^3 at S.T P. is
   [A] 133 [B] 146 [C] 266 [D]292

5. The volume occupied by 1.58g of a gas at S.T.P is $500cm^3$. What is the relative molecular mass of the gas?
   [A] 28 [B] 32 [C] 44 [D]71 {G.M.V. at S.T.P = $22.40m^3$}

DETAILED ANSWERS TO CHEMISTRY QUESTIONS

1. using $C_1V_1 = C_2V_2$, C_1 =11.0m, V_2 =Idm^3, C_2 = 0.05m , V_1 =?) ;
   $V_1 = \frac{C_2V_2}{C_1} = \frac{0.05mx1dm^3}{11.0m}$ $= 4.5\ 10^{-3}$ x100 = 4.45cm^3 Ans. **A**
2. Atomic mass of magnesium is 49 ; No of moles = $\frac{no\ of\ particles}{Avogadro\ number}$
   For 24g of mg, it contains 1 atom this the ; 12g of carbon molecule C
3. **C** - the dissolution of sodium chloride in water
4. using $\frac{p_1v_1}{T_1} = \frac{p_2v_2}{T_2}$; $\frac{0.971x146}{18+273} = \frac{p_2v_2}{T_2}$
   At STP P_2 = 1atm T_2 = 273k ; $V_2 = \frac{0.971\ x146\ x273}{291x1} \cong 133$ ***A***
5. At STP 1mole of a gas occupies $22.4dn^3$, but $500cm^3 = 0.5dm^3$, if 1.58g => $0.5dm^3$
   xg => $22.4dm^3$; $xg => \frac{22.4dm^3 1.58g}{0.5dm^3} = 70.784g$ = 71 Ans. **D**

PHYSICS

1. A solid metal cube of side 10cm is heated from 10^0c to 60^0c. if the linear expansivity of the metal is $1.2x10^5k^{-1}$, calculate the increase in its volume
   (A)$0.6cm^3$ (B) $1.2cm^3$ (C)$1.8cm^3$ (D)$3.6cm^3$ (E) $6.0cm^3$.

2. A gas has a volume of 546cm^2 at 0^{0}c. What is the volume of the gas at-100^{0}c if its pressure remains constant?
(A)346cm^3 (B)446cm^3 (C)546cm^3 (D)545cm^3 (E) 745CM^3.

3. An image which cannot be formed on a screen is said to be
(A) inverted (B) real (C) virtual (D) erect (E) blurred

4. An object is placed between two mirrors which are inclined at an angle of 120^0 and facing each other. Determine the number of images observed in two mirrors
(A) 1 (B) 2 (C) 3 (D) 4 (E) 5.

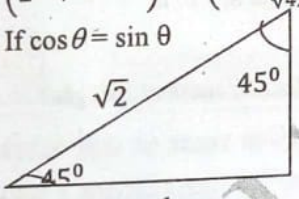
10. Which of the following have the longest wavelengths?
(A) Infra-red rays (B) gamma rays (C) x-rays (D) ultra-violent rays (E) radio waves.

ANSWERS TO PHYSICS QUESTIONS
1. C – 1.8cm^3 2. E - 746cm^3 3. C – virtual. 4. B – 2 5.E - radio wave

MATHEMATICS
1. Evaluate $(2^0 + 4^{-½})^2$ A. 2 B. 4 C. $\frac{9}{4}$ D.5 E.1
2. If cosθ = sinθ then θ is A. 30^0 B. 45^0 C. 60^0 D.90^0 E. 0^0
3. The mean of the numbers s 3, 6, 4, X and 7 is 5, Find the standard deviation
(A) $\sqrt{2}$ (B) $\sqrt{3}$ (C) 2 (D) 3
4. Find the derivative of the function y = -2x^2(2x- 1) at the point x= -1,
(A)-6 (B) -4 (C) 16 (D) 18
5. Find the mean deviation of 1, 2, 3, and 4,
(A) 1.0 (B) 1.5 (C) 2.0 (D)2.5

DETAILED SOLUTION TO MATHEMATICS QUESTIONS
1. $\left(2^0 + 4^{-1/2}\right)^2 = \left(1 + \frac{1}{\sqrt{4}}\right)^2 = \left(1 + \frac{1}{2}\right)^2 = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$ ---------(C)

2. If $\cos\theta = \sin\theta$



$\text{Sin}45^0 = \frac{1}{\sqrt{2}}$; $\cos 45^0 = \frac{1}{\sqrt{2}}$
Hence θ = 45^0 ….. **(B)**

3. Mean of 3, 6, 4, x, 7, $= \frac{\sum x}{n} = \frac{3+5+6+4+x+7}{5}$

$$\bar{x} = 5 \quad variance = \frac{\sum(x-\bar{x})^2}{n} = \frac{10}{5} = 2 \; ; \; S.D = \sqrt{variance} = \sqrt{\frac{10}{5}} = \sqrt{2} - A$$

4. $y = 2x^2(2x-1)$ we can choose to use product rule or we expand. Expanding, we have $y= 4x^3 -2x^2$ then $\frac{dy}{dx} =$

$12x^2 - 4x$ *at point* $x = 1$; $\frac{dy}{dx} = 12(-1)^2 - 4(-1) = 12 + 4 = 16 - C$

5. We first of all find the mean;
Mean $\bar{x} = \frac{\sum x}{n} = \frac{1+2+3+4}{4} = \frac{10}{4} = 2.5$; To get mean deviation, we create a table

x	x -$\bar{x}$; ($\bar{x}$ -2.5)	Ix -$\bar{x}$I
1	-1.5	1.5
2	-0.5	0.5
3	0.5	0.5
4	1.5	1.5
		4.00

Thus $\sum Ix - \bar{x}I = 4.00$;
Mean deviation MD = $\frac{\sum Ix-\bar{x}I}{n} = \frac{4}{4} = 1 - A$

CHEMISTRY

1. 8.1g ---------- (D)
2. One of the test for unsaturation ----------(C)
3. Total volume of mixture = $20cm^3 + 35cm^3 + 15cm^3 + 10cm^3 = 80cm^3$ mole fraction of H = $\frac{20cm^3}{80cm^3} = 0.25$----------D
4. D---- nitric acid to sodium hydroxide note neutralization reaction is reaction of acid & base
5. D—W is the most acidic solution
6. E. ------- Ammonium Carbonate will Decompose to give Carbon Dioxide, Water and ammonia.
7. D- threats of the forward and backward reaction are equal
8. C- tin
9. Carbon - D
10. The double bond – C

PHYSICS

11. (A)
12. 245N ----------(C)
13. E---------iii only
14. C------black
15. E
16. A ------ $\Phi = n_i C$?
    Where Φ = 22, 000 m=1.5;$?_2$-$?_1$
    = 30-20=10 ; C= Φ M
    => C = $\frac{22.000}{5x\ 10}$ = 1466.71kg^1 C^{-1}
17. This is an inelastic collision
    $m_1u_1 + m_2u_1 = (m_1 + m_2)V$
    $V = \frac{m_1u_1 + m_2u_2}{m_1 + m_2} = \frac{0.5(10)+0.5(0)}{0.5+0.5}$
    Note: u_2 is equal to zero, because the other mass is at rest.
18. C - Increases gradually
19. Neutral - C
20. Power of a lens P = 1/f Where f is the focal length in meters (m) 0.25m – A

Mathematics

21. $(225^{\frac{1}{2}} + 85^0) \times 256^{-\frac{1}{4}}$
    $=> \sqrt{225} + 85^0 \times \frac{1}{\sqrt[4]{256}}$
    $= 15 + 1 \times \frac{1}{4}$ => $16 \times \frac{1}{4} = 4$ ---------- (B)
22. (C)
23. C--------$^5/_6$
24. $4^{2x} \div 4^{3x} = 2$; $2^{4x} \div 2^{6x} = 2^1$; $2^{4x-6x} = 2^1$;
    4x-6x = 1; 2x= 1∴ x = $^{-1}/_2$----------B
25. The mode is the number that occurred most frequent Mode=7 -D
26. NB: speed (Velocity, s) = Distance (D)
    Time (T)
    Distance do not vary but speed and time vary
    First statement S = D/2; =25 = D
27. $2x^2 + + x-15 = 2x^2+6x-5x-15$
    $(2x^2+6)-(5x+15)$
    $2x(x+3)-5(x+3)-5(x+3) = (2x-5)(x+3)$ -B
28. $\frac{log27}{\log 81} = \frac{\log (27)^{1/2}}{\log 81} = \frac{\log (3^3)^{1}/_{2}}{log3^4}$
    $= \frac{\frac{x}{7}log9}{4\log 3} = \frac{1}{2}x\frac{1}{4} = \frac{3}{8}$ - B
29. 2. $y - 3x^2 - x^3$ the polynomial is to degree of three, so it has two turning points. We first of all determine the turning points. At turning points
    $$\frac{dy}{dx} = o\ then\ \frac{d}{dx}(3x^2 - x^3) = 0;$$
    $6x - 3x^2 = 0 \Rightarrow 3x(2-x) = 0\ thus x = 0 or x = 2$
    find the maximum, by taking the second differential
    $$\frac{d^2y}{dx^2} = \frac{d}{ds}(6x - 3x^2) = 6 - 6x\ \ at\ x = 0$$
    $$\frac{d^2y}{dx^2} = 6 - 6(0) = 6 > 0 (minimum point)$$
    $$at\ x = 2\ \frac{d^2y}{dx^2} = 0 - 6(2) - 6 - 12 = -6 < 0$$
    (**maximum point**) The maximum value of y is at the point where x = 2; substituting it in the equation, we have $y = 3x^2-x^3$
    $$y = 3(2)^2 - (2)^3 = 3(4) - \ 8 = 4 - C$$
30. -1<3-2x≤5?we solve the inequalities differently and then combine them
    -1<3-3x >3-2x >-1: 3+1>2x;2x<4;x<2
    For the other part 3-3x < 5 >3 ;
    5≤2x: 2≤ 2x > 2x ≥ 2 > x≥ 1 thus 1 ≤ x < 2 values in this range are -1,0,1 - - - C

English

31. A
32. D
33. D
34. B
35. B
36. A — To
37. C-unusual
38. D - extinguish
39. Very - A
40. will – B

BIOLOGY

41. D
42. A
43. D
44. C
45. D
46. B
47. **C** - Liver
48. C – Chlorophylluos parts
49. Mitosis – C
50. Lichens - B

FUTO CBT POST UTME TEST 2015/2016

SCHOOL OF PHYSICAL AND BIOLOGICAL SCIENCE 30mins

(Departments of Physics, Mathematics, Statistic,Computer, Geology,Science Lab.Tech., Industrial Chemistry, Biotechnology,Biological Science, Biochemistry, Industrial Microbiology)

Instructions: Click on your selected answers and move on to the next question. Use your photo card as your rough sheet. Do not move your legs around to avoid shutting down the system. Report to any admistrator in case of any issue.

ENGLISH

In each of the following sentences, there is one word underlined and one gap. From the list of words lettered A to E, choose the word or group of words that is most nearly opposite in meaning to the underlined word and that will, at the same time, correctly fill the gap in the sentences.

1.I encouraged my younger brother to take on law as a profession while I..... my sister from doing so
(a) Financed (b) warned (c) dissuaded (d) persuaded (e) helped

2. People who are normally.....often turn to be dauntless heroes in the face of real danger
(a) Unsteadily (b) colorless (c)cowardly (d) bashful (e) unfriendly

From the alternatives provided select the one which most appropriately completes the sentences.

3.The hotel ---------- is at creek road
(a) which I a staying (b) in where I an staying (c) that I am staying (d) at which I am staying (e) I stay

4.Do you mind if I wait for the reply? I'd rather you---- again tomorrow.
(a) called (b) will call (c) can call (e) were calling

5. My price for the shoes is fifty naira. I cannot------anything less than that.
A. bear with B. settle for C. agree with D. tolerate E. settle with

6. Since the writer did not indicate his name, the editor decided not to publish such-----article.
A. a discourteous B. an anonymous C. a cowardly D. a libelous E. unfriendly.

From the words or groups of words lettered A to E below each of the following sentences, choose the word or group of words that is nearest in meaning to the underlined word or group of words as used in the sentence

7. An open car has no protection against the elements to run the marathon race.
(A) Weather (B) emergency (C) molecule (D) atoms (E) agreeable.

8. The chairman is of the opinion that accepting the proposal would be inimical to the objectives of the association.
(A) harmful (B) romantic (C) compromising (D) practical (E) helpful.

Choose the word phrase from A to E which has the same meaning as the underlined word or words in each sentence.

9. When a man is immune to an illness. he is
(a) opposed to it (b) attached to it (c) hasted by it (d) protected against (e) addicted to it

10. In a civilized society, it is unseemly to emit a loud belch at the end of a meal
(a) noisy (b) annoying (c) stupid (d) outrageous (e) impolite.

PHYSICS

11. Which of the following is a derived unit? (A) Meter (b) coulomb (c) kilogram (d) second (e) ampere

12. A bat emits is sound at a speed of 1650s and receives the echoes 0. 15s later. Calculate the distance of the bat from the reflector (a) 8.75m (b) 10.50m (c) 87.75m (d) 123,75m (e) 330.00m

13.Two identical waves travelling in the same direction are super imposed. What should be the phase difference between the waves for maximum destructive interference to occur?
(a) 20^0 (b) 45^0 (c) 180^0 (d) 255^0 (e) 270^0

14.The odour of a leaking gas is perceived at a distance from the source. This is made possible by the process of
(a) sublimation (b) diffusion (c) osmosis (d) evaporation (e) capillarity

15. A train has an initial velocity of 44m/s and an acceleratif-4m/s^2. Its velocity after 10s is
A. 2m/s B. 4m/s C. 8m/s D. 12m/s E. 16m/s.

16. A simple pendulum with a period of 2.0s has its length doubled. Its new period is
A. 1.005 B. 1.41s C. 0.35s D. 2.03s E. 2.83s

17.An object is projected with a velocity of 100ms^{-1} from the ground level at an angle to the vertical. Total time of flight of the projectile is 10s, calculated (g=10ms^{-1}) (A)0^0 (B)30^0 (C)45^0 (D)60^0 (E)90^0.

18.A gas has a volume of 546cm^2 at0^0c. What is the volume of the gas at-100^0c if its pressure remains constant?
(A)346cm^3 (B)446cm^3 (C)546cm^3 (D)545cm^3 (E) 745CM^3.

19. In electrolysis experiments a cathode of mass 5 g is found to weigh 5.0lg after a current of 5A flows for 50 seconds. What is the electrochemical equivalent of the deposited substance?
A. 0.00004g/C B. 0.00002g/C C.0.02500g/C D. 0.05000g/C E. (J.OIK 0 lg/C

20. A magnetic' needle is suspended first at earth's north magnetic pole and then al a point on the magnetic equator.? The respective angles between the needle arid the horizontal are:

A 0° and 0° B. 60°and 60° C. 90° and 90° D. 90° and 0° E. 0° and 90°

CHEMISTRY

21. How many molecules are there in 14g of nitrogen gas at S.T.P?(N=14,Avogadro Number = 6.0×10^{23} mo^{-1})
(a) 1.2 x I0 (b) $3.0 \times I0^{23}$ (c) 6.0×10^{23} (d) 1.2×10^{24} (e) $3.0 \times I0^{23}$
22. $120cm^3$ of hydrogen were sparked with $60cm^3$ of oxygen at 110°C. What was the volume of steam produced? The equation for the reaction is $2H_2O\ (g) + O_2(g) \longrightarrow 2H_2O(g)$ (a) $30cm^3$(b) $60cm^3$(c) $90cm^3$ d) $120cm^3$ (e) $180cm^3$
23. In the purification of town water supply, alum is used principally to (a) kill bacteria (b) control the PH water (c) improve the taste of the water (d) coagulate small particles of mud
24. The solubility of Na_3AsO_4 in the ethanol? (a) 87.2% (b) 38.9% (c)19.1% (d) 13.7% (As= 75, Na=23, O=16, H=1)
25. $35cm^3$ of hydrogen was sparked with $12cm^3$ of oxygen at 1100 C and 760 mm Hg to produce steam. What percentage of the total volume of gas left after the reaction is hydrogen?
A. 11% B. 31% C. 35% D. 69% E. 80%.
26. In the extraction of iron In the blast furnace, lime stone is used to A. release CO_2 for the reaction B. reduce the iron ore C. increase the strength of the iron D. remove impurities.
27. $10.0dm^3$ of air containing H_2S as an impurity was passed through a solution of Pb (NO_3) until all the H_2S had reacted. The precipitate of Pbs was found to weigh 5.02g. According to the equation, Pb $(NO_2)_2$+ H2S PBS+HNO2 the percentage by volume of hydrogen sulphide .
(A) 50.2 (B) 47.0 (C) 4.70 (D) 0.47 (pt = 207,s = 32 GMV at S.T.P = $22.4dm^3$)
28. The Avogadro number of 24g of magnesium is the same as that of (A) 1g of hydrogen molecules (B) 16g of oxygen molecules (C) 12g of carbon molecules (D) 35.5g of chlorine molecules.
29. Helium atoms are chemically uncreative because (a) there are no electrons around the nucleus (b) the number of protons equal the number electrons (c) there are equal number of protons and neutrons in the nucleus (d) the outer electron shell is completely filled (e) the atoms contain only protons
30. How many grams of HBr would exactly be required to react with 2g of propyne? (C = 12. H = 1. Br = 80)
(a)4.1g (b)6.lg (c)8.lg (d) l0.g (e) 16.2g

MATHEMATICS

31. Factorize the following expression: $2X^2 + X - 15$. (a) (2x + 5) (x -3) (b) (2x - 5) (X + 3) (c) (2x - 5) (x - 3) (d) (2x -3) (x + 5) (e) (2X + 5) (X+3)
32. For what value of the expression (y + 2)1(y^2 -3y-10) of y is the equation undefined
A. y=0 B. y=2 C. y=3 D. y=5 E. y=10
33. P varies directly as the square of Q and inversely as R. if P=36 when Q = 3 and R=4, find P when Q = 5 and R =2. (a) 72 (b) 100 (c) 90 (d) 200 (e) 125
34. A cone is formed by bending a sector of a circle having an angle or 210°. Find the radius of the base of the cone. If the diameter of the circle is 12cm. (a) 7.00cm (b) 1.75cm (c) 21cm (d)3.50cm (e)2.21cm
35. Find the 9^{th} term of the arithmetic progression, 18, 12, 6, 0,-6 .....A. -54 B--30 C 30 D. 42 E. 54
36. Evaluate $\log_{10}25 + \log_{10}32 - \log_{10}8$. A.0.2 B. 2 C.100 D.409 E. 4
37. Express 0.00562 in standard form (A) 5.62×10^{-3} (B) 5.62×10^{-2} (C) $5.6^2 \times 10^2$ (D) 5.62×10^3
38. An arc of length 22cm subtends an angels of at the Centre of the circle. What is the value of 0 if the radius of the circle is 15cm? (take =22/7) (A) 70° (B) 84° (C) 96° (D)156^0 (E) 168^0
39. P and Q are fixed points and X is a variable point which moves so that angles PXQ =45°. What is the focus of X? (a) A pair of straight lines parallel to PQ (b) The perpendicular bisector of angle PXQ (c) A are of a circle passing through P and Q (d) A circle with diameter PQ E the bisector of angle PXQ
40. What factor is common to all the expressions x^2 —x, $2x^2$ +x — 1 and x^2 -17
(a) x (b) x-1 (c) x + 1 (d) no common factor (e) (2x1)

BIOLOGY

41. Mycorrhiza is an association between fungi and
(A) protozons (B) roots of higher plants (C) bacteria (D) filamentous algae.
42. An insect with a mandibulate mouth part will obtain its food by
(A) biting and chewing (B) chewing and sucking C) chewing (D) sucking
43. In which of the following parts of the cell is the chromosomes found?
(a) nucleus (b) golgi body (c) cytoplasm (d) cell membrane (e) cell wall
44. Ultra filtration in the kidney takes place in the
(a) loop of Henle (b) renal vein (c) Bowman's capsule (d) pelvis (e) pyramid
45. The blood vessel which carries blood from the alimentary canal to the lever is
A. hepatic artery B. hepatic vein C. hepatic portal vein D. mesenteric E. hepatic mesenterism
46. Interveinal chlorosis is normally associated with the deficiency of
A. magnesium B. potassiun C. iron D. calcium E. iodine
47. The caste of termites that lacks pigmentation is the (A) king (B) worker (C) soldier (D) queen
48. The heart of the adult blood, the cells which lack nuclear are the
(A) erythrocytes (B) lymphocytes (C) two ventricles and one auricle (D) one vehicle and two auricles.

49. Which of the following structures is capable of producing more tissues in the stem of a herbaceous flowering plant? [A] Epidermis [B] pericycle [C] xylem [D] cambium.

50. The heart of the adult frog consists of [A] two auricles and two ventricles [B] one auricle and one ventricle [C] two ventricles and one auricle [D] one ventricle and two auricles

DETAILED SOLUTIONS TO 2015/2016 SOBS & SOPS CBT POST UTME

ENGLISH

1. C - cowardly
2. C – dissuades
3. A- which am staying
4. A-called
5. B - Settle for
6. B - An anonymous
7. Weather – A
8. Harmful – A
9. D — Protected
10. E--Impolite

PHYSICS

11. B - Coulombs Q = It
12. Let distance be S;
$S = \frac{Vt}{2} = \frac{1650 \times 0.15}{2} = 23.75m$ – D
13. D----255^0
14. B----diffusion
15. U = 44m/s; a = 4m/s^2 ; V = ? ; t = 10s
using v + at ; v = 44m/s + (-4m/s^2) x 10s
= 44m/s – 40m/s = 4m/s ..... B
16. $T \propto \sqrt{L}$; $\Rightarrow \frac{T_1}{T_2} = \sqrt{\frac{L_1}{L_2}}$
Where $T_1 = 2s$; $T_2 = ?$; $L_2 = 2L_1$
Substitution $\frac{2}{T_2} = \sqrt{\frac{L_1}{L_2}}$; $\frac{4}{T_2^2} = \frac{1}{2} \Rightarrow T_2 = \sqrt{8} = \sqrt[2]{2}$
17. 60^0 – D
18. E - 746cm^3
19. A $Z = \frac{m}{it}$ Where m= actual mass deposited
ie (5.01-5)=0.01; t=50s ; 1 = 50s $\Rightarrow \frac{0.01}{5 \times 50}$ = 0.00004g/c
20. D

CHEMISTRY

21. A t STP, 28g of N_2= 6.02×10^{23}
∴ 14g of $N_2 \rightarrow ? \rightarrow \frac{12 \times 6.02 \times 10^{23}}{28} = 3 \times 10$ ---B
22. $2H_2 + 0_2 \rightarrow 2H_20_2$
Ration 2 :1:2 ;The volume of steam is 120cm^3 - D
23. D------coagulate small particles
24. mm crystal salt= 424gmol^{-1} ;
mm of anhydrous salt = 208gmol-1
if 38.9g of H_2O → 1 mole of H_2O
xg of H2O → 1 mole of anhydrous salt
Xg = 38.9g; No of moles = $\frac{mass}{molar\ mass}$;
$X = \frac{38.9}{208} = 0.138$ %mass = 0.138 x 100 ≈ 13.8% - D
25. The equation of the reaction is given as
$2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O$; $O_2 = 12cm^3$
12cm^3 of $O_{2(g)}$ will react with 24cm^3 of $H_{2(g)}$ to produce steam. If 35cm^3 = 100% and 24cm^3 react with $O_{29(g)}$ the volume left is 11cm^3 = x%
$\therefore x = \frac{11 \times 100}{35} = \frac{11 \times 20}{7} = 31\%$ ------ B
26. D
27. 4.7% - C
28. Atomic mass of magnesium is 24g.
No of molar = $\frac{no\ of\ particles}{avogadros\ number}$ for 24g of Mg,
it contains 1 atom thus the answer is 12g of carbon molecules-C
29. D —The Outer Electron Shell is completely filled.
30. Propyne=CH_3CCH
Molar mass = (12+Ix3+ 12 x2+ 1)=40 Reacting mass = 2g; $\therefore mole - \frac{m}{m} - \frac{2}{4:1} - 0.05$
CH_3CCH+ $HBrCH_3 \rightarrow$ CHCHBr
1mole: 1mole
0.05 : 0.05
Also molar mass of HBr = 1+80 = 81g/mol
Mass = mole x molar mass 0.05x81 = 4.05g =4.1g---A

MATHEMATICS

31. $2x^2$ + + x-15 = $2x^2$+6x-5x-15 ; $(2x^2+6)-(5x+15)$
2x(x+3)-5(x+3)-5(x+3) = (2x-5)(x+3) ----B
32. $\frac{y+2}{y^2-3y-10}$ for it to be undefined, y^2-3y-10; (y-5) (y+2) = 0
Thus y = 5 or y = -2; y =5 --- – D
33. $P\ \alpha\ \frac{Q^2}{R}$; $P = \frac{KQ^2}{R}$; $36 = \frac{K3^2}{4}$; $K = \frac{36 \times 4}{9}$;
K = 16 ; $P = \frac{16 \times 5^2}{2} = 200$ ---------D
34. The circumference of the cone
= the length of the arc = $2\pi r = \frac{\theta}{360} x 2\pi r$;
$= 2\pi r = \frac{210}{360} x\ 2\ x\ \frac{22}{7}\ x\ 6$; N.B radius = diameter/2)
$2\pi r = 22$; $r = \frac{22}{2} x \frac{7}{22} = \frac{7}{2} = 3.50cm$ ---------D
35. a = 18 ; d = -6 ; n= g ; ∴ nth = a+ (n-1)d
gth = 18 + (g-1)(1-6) = 18 + (8) x -6 = 18 – 48 = -30 --B
36. $\log_{10} 25 + \log_{10} 32 - \log_{10} 8 = \log_{10}(25 \times {}^{32}/_{8})$
$\log_{10}(25 \times 4) = \log_{10} 100 = 2 \log_{10} 10 = 2$ ...B
37. A
38. Length of an arc $L = \frac{\theta}{360}$ X $2\pi r$; given L =22 , R =15
$L = \frac{360}{2\pi r} = \frac{360X22}{2X\frac{22}{7}X15} = 84$ ---- B
39 C — are of a circle passing through p and q
40. x^2- x x(x-1), - $2x^2$- x – 1, - (2x -1) (x+1) x^{2+} -1- (x+1) (x-1) none of the above ----- D

Biology

41. Roots of higher plants – B
42. Biting and chewing – A
43. A- nucleus
44. C-Bowman's capsule
45. A - hepatic artery
46. A -magnesium
47. Soldier – C
48. one Ventricle and two auricles –D
49. D - Cambium
50. C – two ventricles and one auricle

FUTO CBT POST UTME TEST 2015/2016
SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY AND SCHOOL OF MANAGEMENT TECHNOLOGY 30mins

(SAAT Departments: Agric. Extension, Agric. Economics, Soil Science, Crop Science, Animal Science,Forestry and Wide Life. Fishery and Aquaculture; SMAT Departments: Information Management Tech.,Financial Management Tech., Maritime Management Tech., Project Management Tech., Transport Management Tech.)

Instructions: Choose subject and answer all. Click on your selected answers and move on to the next question. Use your photo card as your rough sheet. Do not move your legs around to avoid shutting down the system. Report to any admistrator in case of any issue.

MATHEMATICS

1. In set theory, an empty set is represented with A. Φ B.{} C. {.} D. A and B E. All of the above

2. The value of sin300°is A. $\sqrt{3}/2$ B.1/2 C. -1/2 D.- $\sqrt{3}/2$ E. 1

3. The 2nd and 5th terms of a geometric progression are 24 and 81 respectively find the common ratio
A. $^2/_3$ B.3/2 C.5/2 D $^7/_2$ E. $^9/_4$

4. The percentage score of 10 students in a test are 12, 56, 42, 21, 25, 18, 10, 53, 42, 24, what is the median Score. A. 25.4 B. 27.6 C. 263 D. 27.5 E. 24.5.

5. Multiply $x^2 + x + 1$ by $x^2 - x + 1$.
[A] $x^4 + 3x^2 + x + 1$ [B] $x^4 + x^2 + 1$ [C] $x^4 + 4x^2 - 6x + 1$ [D] $x^4 - 6x^2 - 4x + 1$ [E] $x^4 - x - x^3 x^2 + 1$.

6. The sum of the root of a quadratic is 5/2 and then product of its root is 4. The quadratic equation is
[A] $2x^2 + 5x + 8 = 0$ B] $2x^2 - 5x + 8 = 0$ [C] $2x^2 - 8x + 5 = 0$ [D] $2x^2 + 8x - 5 = 0$
[E] $2x^2 - 5x + 8 = 0 \Rightarrow 2x^2 - 5x - 8 = 0$.

7. Determine the maximum value of $y = Sx^2 - x^3$ (A) O (B) 2 (C) 4 (D) 6

8. Find the derivative of the function $y = -2x^2(2x - 1)$ at the point x= -1, (A)-6 (B) -4 (C) 16 (D) 18

9. Simplify $\cos^2 x (\sec^2 x \tan^2 x)$ A. 2 B. 4 C. -1 D. 1 E. 5

10. If $52_n - 24_n = 25_n$ then n is = A. 4 B. 7 C. 11 D. 5 E. 2

BIOLOGY

11. In the fish the sense organs which detect movement in the water are located within the
A. Gills B. Operculum C. Nostril D. Median fins E. Lateral line

12. The male toad differs from the female by having A. Vocal sacs B. Shorter hind limbs C. Longer fore limbs D. Bulging eyes E. Nictating membrane

13. .... is not a major air pollutant
A. carbon monoxide B. ozone C. oxygen D. Sulphur dioxide E. hydrogen sulphide

14. Which bone is called the bone of the digits?
A. humerus B. femur C. sacrum D. phalanges E. tibia

15. In water culture experiment, a plant showed poor growth and yellowing of the leaves. These may be due to deficiency of [A] copper [B] iron [C] magnesium [D] calcium.

16. In million's test, when the reagent is added to a protein food item, a white precipitate is produced which turns [A] blue on heating [B] yellow on heating [C] green on heating D]red on heating

17. The response of plants to external stimuli in a non-directional manner is known as
(A) tactic movement (B) phototropism (C) geotropism (D) nastic movement.

18. The pioneer organisms in ecological succession are usually the
(A) mosses (B) llohens (C) ferns (D) algae

19. Which vertebra has a projection called odontoid process?
A. Atlas B. Thoraic C. Lumbar D. Axis E. Caudal

20. Which of the following insects has an incomplete metamorphosis during life cycle?
A. Grasshopper B. Bee C. Mosquito D. Housefly E. Butterfly

ENGLISH

In each of the following questions, choose the option nearest in meaning to the underlined word.

21. Many people are often deceived by superficial knowledge
(A) Cheep (B) Shallow (C) Attractive (D) Penetrating (E) All the above

22. Martha came late this morning, but she gave a plausible excuse
(A) Reasonable (B) Very interesting (C) Detailed pathetic (D) Stupid

In questions 23 and 24 choose the option opposite in meaning to the word underlined

23. John is naturally taciturn. A. friendly B. cheerful C. dumb D. lively E. garrulous
24. She is loved for her altruism. A. benevolence B. sincerity C. selfishness D. selflessness E. kindness

From the list of words choose the one that best completes each sentence

25. Mark is very handsome fellow who informs me that he has ---------- for pretty girls
[A] a heart [B] a lip [C] an eye [D] a check
26. Wale Agun, in creating his characters, draws freely ----- his experience in life
[A] by [B] in [C] on [D] of
27. He ---- thirty when I first met him (A) must have been (B) will have (C) ought to be (D) must have to be
28. Good discipline was instructed – the success achieved by the college (A) for (B) to (C) in (D) with
29. The university has large collection of sporting ----------
A. Equipment B. Equipments C. Costumes D. Aids E. Facility
30. I have already --------- it on the sitting room wall. A. Hanged B. Hunged C. Hang D. Hung E. Hanging

CHEMISTRY

31. Which of these metals, Mg Fe, Pb and Cu will dissolve in dilute HCl if air is blown through the solution?
A. Mg and Fe only B. all the metal C. Mg. Fe, and Cu,, D. Mg, Fe and Pb E. Mg, Pb and Cu.
32. The name pentanone is not specific and proper because it can refer to
A . 2-pentanone and 3-pentanone B.I-penatanone and 5-pentanone C. methyl propanone and propyl methanone D. methyl propanone and methyl propyl butanone E. methyl leatanne and Butyipropanone.
33. Which of the following have saturated isomer? A. methane and ethane B. methane and propane C. ethane and propane D. butane and methane E. butane and pentane
34. Which of these mathematical relationship is for Charles law?
A. $V=k(1/p)$ B. $V = KT/P$ C. $V = KT$ D. $V=1/p$ E. $V= P/T$
35. Powdered marble reacts faster with hydrochloric acid solution than the granular form because the powdered form has [A] more molecules [B] more atoms [C] larger surface area [D] relatively large mass.
36. The pOH of a solution of 0.25 mol dm^{-3} of hydrochloric acid is [A] 12.40 [B] 13.40[C]14.40[D] 14.60
37. Sulphur (IV) oxide bleaches by (A) reduction (B) Oxidation (C) Hydration (D) Adsorption
38. Carcinogenic substance is
(A) Asbestos dust (B) Sawdust (C) Nitrogen (II) oxide (D) Carbon (II) oxide.
39. An element X_1 forms a volatile hydride XH_3 with a vapour density of 17.0. The relative atomic mass of X is A. 34.0 B. 31.0 C. 20.0 D. 14.0 E. 30.0
40. How many moles of limestone will be required to produce 5.6g of CaO?
A. 0.20mol B. 0.10mol C. 1.12mol D. 0.56mol E. 0.30mol

PHYSICS

41. A cone in an unstable equilibrium has its potential energy
(A) Decreased (B) Increased (C) Oscillating (D) Unchanged (E) Undulating
42. Apiece of rubber 10cm long stretches 6mm when a load of 100N is hung from it. What is the strain?
(A) $6X10^2$ (B)60 (C)6 (D) 6 (E) $2x10^{-2}$
43. An object of height 12.0cm is placed 240cm from a pinhole camera, if the image distance from the pinhole is 10.0cm calculate the image height. A. 12.0cm B.5.0cm C.120.0cm D.120.0m E. None of the above.
44. Two resistors R_1 and R_2 are connected in parallel, R_2 being greater than R_1 the combined resistance is
A. Less than R_1 B. greater than R_2 C. The sum of RI and R_2 D. The difference of RI and R_2
E. greater than R_1 but less than R_2
45. A sonometer wire of length 100cm under a tension of 10 N, has a frequency of 250Hz. Keeping the length of the wire constant, the tension is adjusted to produce a new frequency of 350Hz. The new tension is
[A] 5.1N [B] 7.1N [C] 14.0N [D] 19.6N.
46. A boy looks at the image of an object in a plane mirror. He observes two images, a main bright one and the other faint. The observed images result from
[A] reflection only [B] refraction only [C] diffraction and interference [D] reflection and refraction.
47. One of the properties of gamma rays is that they are
(A) Negatively charged (B) massive (C) neutral (D) positively charge
48. The wavelength of the, first overtone of a note in a closed pipe of length 33cm is
(A) 44cm (B) 33cm (C) 22cm (D) I7cm
49. A wire of length 15m made of a material of resistivity $1.8 \times 10^{-6}\Omega$-m has a resistance of 0.27Ω. Area of the wire is A. $1.5 \times 10^{-4}m^2$ B. $1.0 \times 10^{-4}m^2$ C. $2.7 \times 10^{-5}m^2$ D. $7.3 \times 10^{-5}m^2$ E. $1.5 \times 10^{-5}m^2$
50. What is the number of neutrons in the uranium isotope, $^{238}_{92}U$? A. 92 B. 146 C. 238 D. 330 E. 119

DETAILED SOLUTIONS TO 2015/2016 SAAT & SMAT FUTO CBT POST UTME

MATHEMATICS

1. A and B ---- D
2. $Sin300^0 => \sin(360^\circ - 60^\circ)$
   $= Sin\,360^\circ Cos60^\circ - Sin60^\circ Cos360^\circ$
   $=> 0 \times \frac{1}{2} - \frac{\sqrt{3}}{2} X1 = -\frac{\sqrt{3}}{2}$ – D
3. $\frac{ar^4}{ar} = \frac{81}{24} => r^3 = \frac{27}{8} = r = \frac{3}{2}$ ..... **(B)**
4. median score of 10, 12, 18, 21, 24, 25, 42, 42, 53, 56.
   $=> \frac{24+25}{2} = 24.5$ ..... **(E)**
5. $(x^2+x+1)(x^2-x+1) = x^4 - x^3 + x^2 + x^3 - x^2 + x + x^2 - x + 1$
   $= x^4 + x^2 + 1$ ..... B
6. Let the roots be a &b
   a+b= 5/2.... (1) ; ab =4.....(2)
   From (1), 2a + 2b = 5 ; a = $\frac{5-2b}{2}$ ..... (3)
   Putting (3) into (2) = $\frac{[5-2b]}{2} = 4$
   $5b - 2b^2 = 8$; $2b^2 - 5b + 8 = 0$ ..... B
7. $y - 3x^2 - x^3$ the polynomial is to degree of three, so it has two turning points. We first of all determine the turning points. At turning points

$$\frac{dy}{dx} = o\ then \frac{d}{dx}(3x^2 - x^3) = 0;$$

$$6x - 3x^2 = 0 \Rightarrow 3x(2 - x) = 0;\ thus x = 0 or x = 2$$

We then distinguish the turning points to find the maximum, by taking the second differential

$$\frac{d^2y}{dx^2} = \frac{d}{ds}(6x - 3x^2) = 6 - 6x \quad at\ x = 0$$

$$\frac{d^2y}{dx^2} = 6 - 6(0) = 6 > 0 (minimum point) \quad at\ x$$

$$= 2\frac{d^2y}{dx^2} = 0 - 6(2) - 6 - 12 = -6 < 0$$

(maximum point) The maximum value of y is at the point where x = 2; substituting it in the equation, we have $y = 3x^2 - x^3$; $y = 3(2)^2 - (2)^3 = 3(4) - 8 = 4 - C$

8. $y = 2x^2(2x-1)$ we can choose to use product rule or we expand. Expanding, we have $y = 4x^3 - 2x^2$ then

$$\frac{dy}{dx} = 12x^2 - 4x\ at\ point\ x = 1 \quad ;$$

$$\frac{dy}{dx} = 12(-1)^2 - 4(-1) = 12 + 4 = 16 - C$$

9. $cos^2x\ (sec^2x - tan^2x)$
10. $52_n - 24_n = 25_n$; Assuming n is of base 7 then; $\frac{52}{-24}\ 25_7$
    $\therefore$ n = 7 -------- **(B)**

BIOLOGY

11. lateral line ..... **E**
12. vocal sacs .....**A**
13. C
14. D
15. **C** - Magnesium
16. **D** - Red on heating
17. Nastic movement - D
18. Lichens - B

ENGLISH

21. Shallow-B
22. Reasonable-A
23. E
24. C
25. **C**----------an eye
26. **A**----------by
27. Must have been - A
28. in – C
29. Equipment ..... A
30. Hung.....D

CHEMISTRY

31. Mg Fe –**A**
    Note: these are metals above hydrogen in the activity series
32. A- pentane and 3- pentanone
33. E
34. C
35. **C**- larger surface area
36. PH = log[1/0H⁻] = log[1/0.25] ; = log 4 = 0.602;
    But PH + POH = 14 ;POH = 14 – PH = 14 - 0.602 = 13.40 ---**B**
37. Reduction - A
38. Asbestos dust – A
39. R.M.M = 2 x V.D ; R.M.M of xH_3 = 2 x 17 = 34
    hence x +3(1) =34; X= 34-3 ; R.A.M of x = 31--**B**)
36. $CaCO_3 \longrightarrow CaO + CO_2$; 1mole ⟶ 56g
    X mole ⟶ 5.6g ; X= $\frac{5.6}{56}$ = 0.1g ------ (B)

PHYSICS

41. Increased - B

Note: A cone in an unstable equilibrium has a high center of gravity. Thus, the PE = mgh is such that PE varies directly as the height if m and g are constant.

42. $strain = \frac{extension}{orignallenght}$; $E = 6mm = 0.6cm$;
    $length = 10cm = 100mm$;
    $$strain = \frac{0.6cm}{10cm} = 0.06 = 6.0\,x10^{-2} - A$$
    Note: Strain has no unit. The units must harmonize.
43. object height = 12cm ; Object distance = 24cm ;
    Image distance = 10cm ; Image height = ?
    Magnification = $\frac{image}{object} = \frac{image\ distance}{object\ distan}$;
    $\frac{x}{12} = \frac{10}{24}$; $x = \frac{10 \times 12}{24} = 5cm$ ..... **(B)**
44. **C**-earth's magnetic flux is entirely horizontal at a place where the magnetic dip is zero.
45. E – recall that f $\alpha\sqrt{T}$, so $\frac{f_1}{f_2} = \frac{\sqrt{Y_1}}{\sqrt{T_2}}$
    f_1= 250Hz, f_2 = 350Hz, T_1 = 10N, T_2 = ?
    $\frac{250}{350} = \frac{\sqrt{10}}{\sqrt{T_2}}$; $\frac{25}{49} = \frac{10}{T_2}$
    $T_2 T_2 = 490/25 = 19.6N$
46. **A**
47. Neutral - C
48. For a closed pipe, first overtone 3fo where f_o is the fundamental frequency of the note.
    Length of pipe l – 33cm. for first overtone,
49. Given $\rho = 1.8x\ 10^{-6}\Omega - m$
    R = 0.27Ω ; A = ? ; L=15m ; $\rho = \frac{R \times A}{L}$; $L = \frac{R \times A}{\rho}$
    A= $\frac{L \times \rho}{R}$; A= $\frac{15 \times 1.8 \times 10^{-6}}{0.27} = \frac{2.7 \times 10^{-5}}{0.27} = 1 \times 10^{-4} m^2$...**(B)**
50. No. of protrons = No. of electron = 92
    Mass no = no of neutrons + no protrons
    238 = no of neutrons + 92 ; No of neutrons = 238 - 92
    =146----- **(B)**

FUTO CBT POST UTME TEST 2015/2016
SCHOOL OF ENVIRONMENTAL SCIENCE AND SCHOOL OF HEALTH TECHNOLOGY 30mins

(SOES Departments: Environmental Tech.,Urban and Regional Planning, Geoinformatics and Survey, Building Tech., SOHT Departments: Public Health, Dental Tech, Optometry, Prothesis and Orthototics, Biomedical Tech.,)

Instructions: Choose subject and answer all. Click on your selected answers and move on to the next question. Use your photo card as your rough sheet. Do not move your legs around to avoid shutting down the system. Report to any admistrator in case of any issue.

CHEMISTRY

1. In the reaction $SnO_2 + 2C \rightarrow Sn + 2CO$ the mass of coke containing 80% carbon required to reduce 0.302kg of pure tin oxide is (A) 40kg (B) 0.20kg (C) 0.06kg (D) 0.04kg. (Sn = 119; O=16, C=12)
2. The volume occupied by 1.58g of a gas at S.T.P is $500cm^3$. What is the relative molecular mass of the gas? (A) 28 (B) 32 (C) 44 (D) 71 (G.M.V. at S.T.P = $22.40dm^3$)
3. Which one of the following is a hydroscopic compound? A. H_2SO_4 B. NaOH C. HNO_3 D.NaCl E. ECl
4. Metallic elements usually have ..... Structure
   A. open packed B. limited packet C. slight-packet D. close-packet E. ring packed
5. The components of universal indicator solution can best be separated by:
   A. chromatography B. filtration C. evapouration D. fractional distillation E. transpiration.
6. The solubility curve shows the variation of solute concentration with
   A. volume B. temperature C. vapour D. pressure E. weight.
7. The component of an atom that contributes least to its mass is the
   (A) proton (B) nucleus (C) neutron (D) electron
8. An element will readily form an electrovalent compound if it electron configuration is
   (A)2, 8, 1 (B)2,8,4, (C)2,8,8 (D)2,8.5
9. How many lone pairs of electrons are there on the central atom of the molecule? (a) 1 (b) 2 (c) 3 (d)
10. A given mass of gas occupies $2dm^3$ at 300K. at what temperature will its volume be doubled, keeping the pressure constant (a) 400K (b) 480K (c) 550K (d) 600K

PHYSICS

11. In a ripple tank experiment, a vibrating plate is used to generate ripples in the water. If the distance between two successive troughs in 3.5cm and the wave travels a distance of 31.5cm, in 1.5s.Calculate the frequency of the vibrator (A) 3.0Hz (B) 6.0Hz (C) 12.0Hz (D) 27.0Hz (E) 73.5Hz.
12. In the normal use of a simple microscope, a person sees an (A) inverted, virtual and magnified image (B) erect, virtual and magnified image (C) erect, real and magnified image (D) inverted, real and magnified image (E) inverted and real image the same size as the object.
13. A copper wire 20m long is heated from 20^0 to 70^0C if the linear expansivity of copper is 1.7×10^{-5}, calculate the increase in length. A. 0.017m B. 1.0m C. 17.00m D. 0.002m E. 1.72m
15. The fundamental frequency produced by a violin string is 270Hz what is the frequency of the fourth harmonic produced by this string A. 270Hz B. 540Hz C. 810Hz D. 1080Hz E. 70Hz
15. The principle of the transmissibility of pressure in fluids at rest in all directions is known as
    A. Archimedes Principle B. Floatation Principle C. Newton's Law D. Pascal's Law E. Boyle's law.
16. The hatch door of a submarine has an area of $0.5m^2$. The specific gravity of sea water Is 1.03. (Assume that $g=10ms^{-1}$, and neglect the atmospheric pressure). The force exerted by sea water on the hatch door at a depth of 200m is A. 1.03×10^5 N B. 1.03×10^3 N C. 1.06×10^5N D. 2.06×10^6N E. 1.03×10^4 Nm^{-2}
17. If two inductors of inductances 3H and 6H are arranged in series, the total inductance is
    (A) 18.0H (B) 9.0H (C) 2.0H (D) 0.5H
18. In an a.c circuit that contains only a capacitor, the voltage lags behind the current by
    (A)90° (B) 180° (C) 60° (D) 30°
19. A spring balance which is suspended from the roof of a lift carries a mass of 1kg at its free end. If the life accelerates upward at $2.5ms^{-1}$ determine the reading on the spring balance ($g=10ms^{-2}$)
    (a) 25.0N (b)12.5N (c) 7.5N (d) 4.0N
20. A block weighting 15N rests on a flat surface and a horizontal force of 3N is exerted on it. Determine the frictional force on the block (a) 0.3N (b) 0.5N (c) 3.0N (d) 5.0N

BIOLOGY

21. The most reliable estimate of growth is by measuring changes in
    (A) length (B)volume (C) surface area (D) dry weight.
22. The natural tendency of organisms as they evolves is to
    (A) decrease in size (B) increase in number (C) develop specialized structures (D) feed indiscriminately.

23. The formation of urine involves all except one
A. ultra filtration B. selective reabsorption C. tubular secretion D. formation of metabolic by products
E. small molecule pass through the walls of capillaries into the capsular space
24. All are different types of ribonucleic acid except one A. transfer ribonucleic B. messenger acid
C. ribosomal ribonucleic acid D. chromosomal ribonucleic acid E. options A and C
25. If a 26 year old man married a one eyed woman and they had four children how many of them would be blind like their father? A. all B. 3 C. 2 D.1 E. None
26. Which of the following structure is not found in a female agama lizard?
A. Pre-anal pads B. Eardrums C. Nuchal crest D. Gular fold E. chloroplast
27. The gall bladder of a mammal has a duct connected to the
(A) liver (B) duodenum (C) small intestine (D) pancreas
28. Rodents gnaw on food with their
(A) molar teeth (B) strong jaws (C) flat-ridged teeth (D) chisel-like front teeth
29. The maintenance of a constant internal environment of an organism is known a
(a) homeostasis (b) hemorhesis (c) turgidity (d) homothermy (e) dieresis
30. A few drop of fehling was added to juice extract from fresh maize grain and boiled. A red precipitate was formed, indicating the presence of (a) alcohol (b) protein (c) non reducing sugar (d) starch

ENGLISH

From the words lettered A to E, choose the word that completes each of the following sentences.

31. The fishermen threw a stone into the river and this caused a .....
(A) sprinkle (B) sparkle (C) splash (D) spring (E) storm.
32. The play was so interesting that the .....clapped for quite along time at the end.
(A) spectators (B) Watchers (C) congregation (D) people (E) audience.
33. The suspect defrauded his ——victim of large sums of money.
A. unsuspected B. unsuspecting C. unexpected D. unexpecting E. suspecting
34. -------All probability, the train will arrive today. A. In B. Under C. For D. By E. Upon.

Choose from the options the word that has the same vowel sound as the one represented by the letter(s) underlined

35. Research A. disturb B. comfort C. affair D. carry E. repeat

Select the word that has the same pattern of stress as the given word.

36. HONOUR A. Hostel B. hyena C. affair D. humane E. repeat

Choose the word(s) that is /are nearly opposite in meaning to the underlined word and which correctly fill in the sentence.

37. He show plenty of <u>good- will</u> to his neighbors, but they bear nothing except .....
(A)bad luck (B)malice (C)anger (D)unhappiness
38. Though many of us were <u>poor</u> quite a few were .....
(A) arrogant (B) prodigal (C) affluent (D) luxurious

Insert the word(s)that best fit(s) in the meaning of the sentence.

39. Legislators must be trained to _____ the truth (a) disguise (b) discern (c) digest (d) disturb (e) distort
40. Never in the history of human conflict has <u>so much been owed by so many to so few</u> (a) many people owed much money of the end of the war (b) A handful of people saved the lives of a nation (c)A few people did a lot of things gratis (d) This conflict caused the largest ransom ever demanded (e) Very little was owed by anyone to anybody.

MATHEMATICS

41. Simply $125^{-1/3} \times 49^{-1/2} \times 10^{0}$ (A) 350 (B) 35 (C) 1/35 (D) 1/350 (E) 0.
42. If log x = 2.3675 and log y=0.9750, find x +y, correct to three significant figures?
(A) 1.18 (B)1.31 (C)9.03 (D)9.44
43. If SinA = $\frac{4}{5}$ and CosB = $\frac{12}{13}$ find the value of Sin(A +B) A. $\frac{63}{65}$ B. $\frac{23}{11}$ C. $\frac{61}{67}$ D. $\frac{5}{13}$ E. $\frac{12}{13}$
44. Simplify $\frac{2\frac{4}{5} \times 1\frac{1}{7}}{3\frac{1}{5} - 3\frac{3}{5}}$ A. $\frac{7}{2}$ B. $\frac{3}{5}$ C. $\frac{5}{7}$ D. $\frac{4}{9}$ E. $\frac{2}{7}$
45. A baker used 40% of a 50Kg bag of flour. If 1/8 of the amount used was for cake, how many kilograms flour was used for cake? A 2 1/2 B. 6 1/4 C. 15 5/8 D. 17 1/2 E. 19 1/3.
46. The variance of a given distribution is 25. What is the standard deviation?
A. 125 B. 75 C. 25 D. 5 E. 3
47. If $y = x^2 - x - 12$, find the range of value of x for which y = 0.(A) x<-3 or x<4 (B) x =-3 or x=4 (C) -3 <x =4 (D)-3 = x =4
48. A final examination requires that a student answer 4 out of 6 questions. In how many ways can this be done?
(A) 15 (B)20 (C)30 (D)45.
49. Ada borrows N10.00 at 2% per month simple interest and repays N 8.00 after 4 month, how much does she still owe? (a) 10.80 (b) 10.65 (c) 2.80 (d) 2.67

50. Find the sum of the 20 terms in an arithmetic progression whose first term is 7 and last term 117?
(a) 2480 (b) 1240 (c) 620 (d) 124

DETAILED SOLUTIONS TO 2015/2016 SOHT & SOES FUTO CBT POST UTME

CHEMISTRY

1.D
2. D
3. A
4. D
5.A
6. B
7. D
8. A
9. C
10. $V_1 = 2dm^3$; $T_1 = 300K$; $V_2 = (2dm^3)2$;
$T_2 = ?$ *from charles law* $V \alpha T$ $V_1/T_1 = V_2/T_2$
$\rightarrow 2/300 = 4/T_2$; $T_2 = 300 \times 4/2 =$
$600K$ ..... **D**

PHYSICS

11.C - 12.0Hz
12. D - inverted, real and magnified image
13. $l_2 - l_1 = \propto l_1(\theta_2 - \theta_1)$
$= 1.7 \times 10^{-5} \times 20 \times 50 = 0.017$ .....(C)
14. *Fundamental freq.* $fo = 270Hz$;
Freq of fourth harmonic
$= 4f0 = 4 \times 270 = 1080H2$ ..... (D)
15.D
16.Pressure, $P = F/A \Rightarrow F = AP = A.h\rho g$
But e = specific gravity x density of water
$= 1.03 \times 1.0kg/m^3 = 1.03kg/m^3$
Hence, force, F = 0.5 x 200 x 1.03 x 10
$F = 1.03 \times 10^4 N/m^2$ .... E
17. For inductors in series the total inductance is equal to the sum of the individual inductances. Thus, 3H + 6H = 9H – B
18. 90^0 – A
19. C – 7.5 N
20. Frictional force $= \frac{weight\ of\ object}{applied\ force} = \frac{15N}{3N} = 5N$ (D)

BIOLOGY

21. D
22. C
23. E
24. D
25. E
26. D
27. A
28. D
29. A
30.C

ENGLISH

31. Splash – C
32. Audience – E
33. B
34. A
35. A
36. B
37. Malice – B
38. Affluent – C
39. B —Discern
40. B — A hand full of people saved the lives of a nation

MATHEMATICS

41. $125^{-1/3} \times 49^{-1/2} \times 10^0 = \frac{1}{125^{1/3}} \times \frac{1}{49^{1/2}} \times 10^0$
$= \frac{1}{5} \times \frac{1}{7} \times 1 = \frac{1}{35}$ - C
42. Log X = 2.3675, Log Y = 0.9750;
X+Y = logx X logy = 2.3675 x 0.9750
= 2.3083 = 2.31 (3s.f) - B
43. $Sin(A+B)$; $Sin A\ Cos B + \sin B\ Cos A$;
$Sin A = \frac{4}{5}$; $\cos A = \frac{3}{5}$;
$Sin B = \frac{5}{13}$; $cos B = \frac{12}{13}$
$\therefore \frac{4}{5} \times \frac{12}{13} + \frac{3}{5} \times \frac{5}{13} = \frac{63}{65}$.....(A)
44. $\frac{\frac{14}{5} \times \frac{8}{7} \times \frac{5}{18}}{\frac{28}{9}} = \frac{8}{9} \times \frac{9}{28} = \frac{2}{7}$.....(E)
45. 40% => $\frac{40}{100}$. 40% of 50kg => $\frac{40}{100} \times 50 = 20kg$
$\frac{1}{8}$ of 20kg was used for cake, ie
$\frac{1}{8} \times 20kg = 2\frac{1}{2} kg$ ------- A
46. Given variance, v = 25
Stand deviation, D = $\sqrt{variance}$
D = $\sqrt{25}$; D = 5 -------- D
47. X<-3 or x > 4-B ; Note: see textbook for proofs
48. This is selection, thus it has to do with combination 15 ------ A
49. S.I = $\frac{P \times R \times T}{100}$; P = N10; R=2% ; T = 4months
S.I = $\frac{10 \times 2 \times 4}{100}$ =N0.80
Amount = p + S.I = N10 + N0.80 = N10.80
Amount owed = 10.80 – N8 = N2.80.....(C)
50. $S_n = \frac{n}{2}(a+l)$; $S_{20} = \frac{20}{2}(7+117)$
$= 10(124) = 1240$ .... (B)

DAY 1 FUTO 2014/2015 POST – UTME SCREENING TEST TYPE V
FOR CANDIDATES OF ELECTRICAL AND ELECTRONICS DEPARTMENT TIME:1HR

USE OF ENGLISH

In questions 1 and 2 choose the option nearest in meaning to the underlined expression.

1. The story has to be taken with a grain of salt. This means that
   A. you need some salt to listen to the story B. there is no salt in the story C. the story is questionable D. the story is true E. you have too much salt in the story.
2. It is usually hard to change the course of action when one crosses the Rubicon. The underlined expression, used in this sentence, means to A. pass through a place called Rubicon B. cross a river called Rubicon C. cross a bridge called Rubicon D. pass a special test E. be Irrevocably committed

In questions 3 and 4 choose the option opposite in meaning to the word underlined

3. Emeka is naturally taciturn. A. friendly B. cheerful C. dumb D. lively E. garrulous
4. He is loved for his altruism. A. benevolence B. sincerity C. selfishness D. selflessness E. kindness

In questions 5 and 6 choose the option nearest in meaning to the word(s) or phrase(s) underlined

5. The gallant soldiers met their waterloo unexpectedly
   A. victory B. trouble C. defeat D. happiest period E. enemy
6. It is futile trying to make bricks without straw. A. fertile B important C. fragile D. vain E. bad

In questions 7 and 8 choose the expression or word which best completes each sentence

7. The student who went home without an exit has apologized__ his misconduct
   A. on B. at C. to D. for E. about
8. The man has atoned ___ his sins. A. upon B. on C. for D. at E. against

Choose from the options the word that has the same vowel sound as the one represented by the letter(s) underlined

9. Rust A. loud B. touch C. bought D. marsh E. roast

Select the word that has the same pattern of stress as the given word

10. ENORMOUS A interest B. solution C. stupidly D. character E. harmony

PHYSICS

11. A ball is thrown vertically upwards from the ground with an initial velocity of 50m/s. what is the total time spent by the ball in the air. A. 2.5s B.5.0s C 10.0s D. 15.0s E. 20.0s
12. A body of mass 60g appears to have a mass of 39g when totally immersed in oil and appears to have a mass 36g when totally immersed in water. Calculate the relative density of oil
    A. $\frac{8}{7}$ B. $\frac{13}{12}$ C $\frac{12}{13}$ D. $\frac{7}{8}$ E. $\frac{13}{20}$
13. Two resistors R_1 and R_2 are connected in parallel, R_2 being greater than R_1 the combined resistance is A. Less than R_1 B. greater than R_2 C. The sum of RI and R_2 D. The difference of RI and R_2 E. greater than R_1 but less than R_2
14. Two capacitances of $6\mu f$ and $8\,\mu f$ are connected in series. What additional capacitance must be connected in series with this combination to give a total of $3\mu f$ A.3 μf B.16 μf C.24 μf D.30 μf E.14μf
15. The upper and lower fixed points of thermometer T are 90 and 10 respectively. Determine the temperature on the Kelvin scale when the reading on T is 30° A. 25K B.298K C.80K D.303K E.293K
16. If a copper has a heat capacity of 80J/°C and specific heat capacity of 400 J/kg. Calculate its mass A. 0.20kg B. 320kg C. 20.0kg D. 0.02kg E. 5kg
17. An object of height 12.0cm is placed 240cm from a pinhole camera, if the image distance from the pinhole is 10.0cm calculate the image height.
    A. 12.0cm B.5.0cm C.120.0cm D.120.0m E. None of the above.
18. Calculate the minimum value of the refractive index of a 45° prism which is used to turn a beam of light by total internal reflection through 90° A. 1 B. 1.50 C. 1.41 D 1.20 E. 4.11
19. A wave of frequency 75Hz form a stationary pattern in a medium where the distance between adjacent nodes is 2.0cm. What is the velocity of the wave A. 3m/s B. 30m/s C. 300m/s D. 0.3m/s E. 150m/s
20. The half-life of a nuclide is 5 days what fraction of the initial sample will remain after 30 days.
    A. $\frac{1}{8}$ B. $\frac{1}{16}$ C. $\frac{1}{24}$ D. $\frac{1}{36}$ E. $\frac{1}{64}$

CHEMISTRY

21. How many faradays of electricity are required to deposit 216 grams of silver from a solution of silver nitrate? A. 1 B. 2 C. 3 D. 4 E. 5
22. Twenty two grams of a certain gas occupy 11.2 litres at s.tp. Assume the gas behaves ideally. How many moles of gas are there in the system? A. 0.5 B. 0.6 C. 0.7 D. 0.8 E.0.9
23. Which is most acidic oxide of the following? A.CO B. MnO. C. CaO D. N_2O E. Cr_2O_3
24. The carbon atoms in propyne are arranged at A.60° B.90° C.109^0 D.120^0 E.180^0
25. Which of the following have saturated isomer? A. methane and ethane B. methane and propane C. ethane and propane D. butane and methane E. butane and pentane
26. When coal is heated at 1000 - 1300°C the product is
    A. coal gas B. coal liquid C. coal peat D. coal flash E. coal bed
27. Which one of the following is a brittle material? A. rubber B. plastic C. thermoplastic D. glass E. gum
28. Which of these mathematical relationship is for Charles law?
    A. $V=k(1/p)$ B. $V = KT/P$ C. $V = KT$ D. $V=1/P$ E. $V= P/T$
29. Kinetic theory of gases have... postulates A.1 B. 2 C.3 D.4 E.5
30. Which of the following have a covalent bond A. silver B. copper C. sodium D. zinc E. diamond

BIOLOGY

31. Which of the following animals lack alimentary canal
    A. earthworm B. jelly fish C. insect D. fish E. mollusk
32. .... is not a major air pollutant
    A. carbon monoxide B. ozone C. oxygen D. Sulphur dioxide E. hydrogen sulphide
33. Which of the following is not a function of a tongue
    A. function as organ of taste B. helps in softening food C. it helps during chewing of food
    D. it helps in swallowing of food E. it is essential in speech
34. The most direct product of meiosis in a plant is
    A. spore B. gamete C. zygote D. sporophyte E. gametophyte
35. Which of the following vertebrate undergo external fertilization?
    A. amphibian B. reptiles C. birds D. mammals E. both C and D
36. Human somatic cells are made up of X and Y chromosome. However chromosome is found in
    A. zygote B. ovum C sperm cell D cell of a female E. egg cells
37. Open circulatory system is found in A. rat B. bird C. toad D. insect E. fish
38. Which bone is called the bone of the digits?
    A. humerus B. femur C. sacrum D. phalanges E. tibia
39. Which of the following is essential for a living cell? A. flagella B. capsule C. cell wall
    D. cytoplasmic membrane E. capsule and cell wall
40. Bacteria flagella impart motility to the cell by A. undulating movement. B. rotatory movement
    C. gliding movement D. swaying movement E. looping movement

Mathematics

41. Simplify $\left(\frac{16}{81}\right)^{-3/4}$ A. $\frac{8}{17}$ B. $\frac{27}{4}$ C. $\frac{27}{8}$ D. $\frac{2}{3}$ E. $\frac{9}{4}$
42. If $x = \frac{a^n + a^{-n}}{2}$ and $y = \frac{a^n - a^{-n}}{2}$ find the value of $x^2 - y^2$ A. 5 B. 4 C. 1 D.3 E. 2
43. What's the remainder when $4x^3-5x + 2$ is divided by (x- 1) A.1 B. 2 C.3 D.-1 E. -2
44. If $a = 2 + \sqrt{3}$ find the value of $a - \frac{1}{a}$. A. $\sqrt{3}$ B. $\sqrt[3]{5}$ C. $\sqrt[3]{5}$ D. $\sqrt[2]{3}$ E. $\sqrt{5}$
45. The 2nd and 5th terms of a geometric progression are 24 and 81 respectively find the common ratio
    A. $2/3$ B.3/2 C.5/2 D $7/2$ E. $9/4$
46. A family of 5 is to sit round a dining table. In how many different ways possible can they sit?
    A. 12 B .16 C. 24 D. 8 E. 14
47. If $\sin\theta = \frac{1}{3}$, θ is acute find the value of $\tan\theta$ A. $\frac{\sqrt{3}}{2}$ B. $\frac{\sqrt{5}}{4}$ C. $\frac{\sqrt{7}}{5}$ D. $\frac{\sqrt{2}}{4}$ E. $\frac{12}{13}$
48. An article bought for ₦8.75 was sold for ₦ 46.65. What is the percentage loss?
    A.12% B.15% C.21% D.24% E. 16%

49. A student's annual interest on his savings account is ₦ 5.000. If the rate of interest is 9½% find the amount he deposited to the nearest Naira. A. ₦ 53.14 B. ₦ 47.63 C. ₦ 52.63 D. ₦ 51.15 E. ₦ 41.65

50. The percentage score of 10 students in a test are 12, 56, 42, 21, 25, 18, 10, 53, 42, 24, what is the median Score. A. 25.4 B. 27.6 C. 263 D. 27.5 E. 24.5.

DAY 1 FUTO POST – UTME SCREENING 2014/2015 TYPE V DETAILED SOLUTIONS

USE OF ENGLISH

6. C 2. E 3. E 4. C 5.C 6.D 7. D 8. C 9. B 10.B

PHYSICS

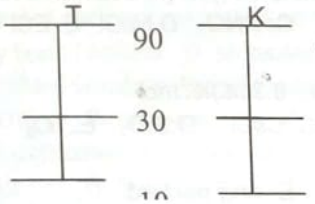
(11) using equation of motion u = 50mls ; g = 10mls^2 ; V = 0 ; V = u +at ; $t = \frac{u}{G} = \frac{50}{10} = 5s$ ..... **B**

(12) Relative Density of oil = $\frac{60-39}{60-36} = \frac{7}{8}$ ..... **(D)** (13) A

(14) Let the unknown capacitance be x, given $6\mu f$, $8\mu f$ to find $x\mu f$; for series $\frac{1}{G} = \frac{1}{6} + \frac{1}{8} + \frac{1}{x} = \frac{1}{3}$

$\Rightarrow \frac{4x+x+24}{24x} = \frac{1}{3}$; 3 (7x +24) = 24x ; 72 = 3x ; x = 24μf ..... **(C)**

(15)



$\frac{30-10}{90-10} = \frac{x-273}{373-273}$

$\frac{20}{80} = \frac{x-273}{100}$ $\Rightarrow$ 2000 = 80x – 21840

x = $\frac{23840}{80}$ = 298K .....**(B)**

(16) Heat capacity C = mc ; m = $\frac{80}{400} = \frac{1}{5} = 0.20kg$ ..... **(A)**

(17) object height = 12cm ; Object distance = 24cm ; Image distance = 10cm ; Image height = ?

Magnification = $\frac{image}{object} = \frac{image\ distance}{object\ distan}$; $\frac{x}{12} = \frac{10}{24}$; x = $\frac{10\times12}{24}$ = 5cm ..... **(B)**

(18) Refractive index $_g\eta_a = \frac{\sin i}{\sin r} = \frac{\sin 45}{\sin 90} = 0.7071$; but $_g\eta_a = \frac{1}{g\eta_a} = \frac{1}{0.7071} = 1.41$ .....(C)

(19) f = 75H$_z$; distance between adjacent nodes = $\frac{\lambda}{2}$; $\frac{\lambda}{2}$ = 2cm ; λ = 4cm = 0.04m

Velocity = 75 × 0.04 = $\frac{3m}{s}$ ..... ***A*** (20) half life = 5days $\Rightarrow \frac{1}{2^6} = \frac{1}{64}$ ..... **(E)**

CHEMISTRY

(21) Mole of silver deposited = $\frac{mass\ deposited}{molar\ mass} = \frac{216}{107.47} = 2$; $Ag^+_{(aq)} + e^- \rightarrow Ag_{(s)}$

1 F produces 1 mole of Ag $\therefore$ *2F will produce 2 moles* of Ag ; Hence 2 faraday ..... **(B)**

(22) (23) D (24)D (25)E (26) (27) D (28) C (29) E (30)E

BIOLOGY

(31)E (32) C (33)C (34)A (35)D (36)C (37)D (38)D (39)D (40)B

MATHEMATICS

(41) $\left(\frac{16}{81}\right)^{-3/4} = \frac{1}{\left(\frac{2^3}{5}\right)} = \frac{1}{8/27} = \frac{27}{8}$ ..... **(C)**

(42) (x-y) (x+y) ; $\left(\frac{a^n+a^{-n}}{2} - \frac{a^n+a^{-n}}{2}\right)\left(\frac{a^n+a^{-n}}{2} + \frac{a^n-a^{-n}}{2}\right)$; $\left(\frac{2a^{-n}}{2}\right)\left(\frac{2a^n}{2}\right) = a^{-n+n} \Rightarrow a^0 = 1$ ..**(C)**

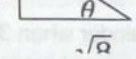
(43) F (1) = ? ; F (1) = 4 (1)^3 -5 (1) +2 ; F (1) = 4 -5 +2 ; F (1) = 1 ..... (A)

(44) $2+\sqrt{3} - \frac{1}{2+\sqrt{3}} \Rightarrow \frac{(2+\sqrt{3})(2+\sqrt{3})-1}{2+\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}} = \frac{(6+4\sqrt{3})(2-\sqrt{3})}{1} = 12 - 6\sqrt{3} + 8\sqrt{3} - 12 = 2\sqrt{3}$ .... **(D)**

(45) $\frac{ar^4}{ar} = \frac{81}{24} \Rightarrow r^3 = \frac{27}{8} = r = \frac{3}{2}$ ..... **(B)**

(46) $(n-1)! = (5-1)! = 4! \Rightarrow 4 \times 3 \times 2 \times 1 = 24$ ..... ***(C)***

(47) $\sin\theta = \frac{1}{3}, tan\theta = \frac{1}{\sqrt{8}} = \frac{\sqrt{8}}{8}$; $\tan\theta = \frac{2\sqrt{2}}{8} = \frac{\sqrt{2}}{4}$ ..... **(D)**



(48) percentage lost = $\frac{8.75-6.65}{8.75} \times \frac{100}{1} = \frac{2.1}{8.75} \times 100 = 24\%$ ..... **(D)**

(49) S. I = $\frac{PRT}{100}$; P = $\frac{5000\ X\ 100}{9.5}$ = 52.631 ..... **(C)**

(50) median score of 10, 12, 18, 21, 24, 25, 42, 42, 53, 56. $\Rightarrow \frac{24+25}{2}$ = 24.5 ..... **(E)**

DAY 2 FUTO 2014/2015 POST – UTME SCREENING TEST

FOR CANDIDATES OF MATERIALS AND METALLURGICAL ENG., CIVIL ENG., POLYMER & TEXTILE, PETROLEUM ENG., CHEMICAL ENG.& AGRICULTURAL ENGINEERING. TIME:1H

CHEMISTRY

1. What volume of oxygen at s.t.p is required for the complete combustion of one mole of CH_4?
   A. 61.5litres B. 24.2litres C. 44.8 litres D. 38.2 litres E. 54.4 litres
2. Calculate the pH 0.1 molar acetic acid? A. 1 B. 2 C. 3 D. 4 E. 5
3. Which of these compounds is a chloroform? A CH_3Cl B. CH_2Cl C. $CHCl_3$ D. CCl_4 E. CH_2Cl_4.
4. Hydrogen bonding is encountered in two different forms
   A. intermolecular and interlonic B. intermolecular and Interdiatonic C Intermolecular and interatonic
   D. intermolecular and intramolecular E. intermolecular and intervalency
5. Which of these catalyst is used for hydrogenation of alkene A. H_2 B. Na C. Pd D. Hg E. Ag
6. The oxidising agent commonly used for conversion of alcohol to aldehyde is A.potassium dichromate (IV) B. potassium dichromate (V) C. potassium dichromate (VI) D. potassium dichromate (VII) E. potassium dichromate (VI
7. Which one of the following is a hydroscopic compound? A. H_2SO_4 B. NaOH C. HNO_3 D.NaCl E. ECl
8. Which of these is constant R for ideal gas?
   A. $8.314Jkmol^{-1}$ B. $8.314J^{-1}Kmol^{-1}$ C. 8.314KJKmol D. $8.314KL^{-1}mol^{-1}$ E. $8.314JK^{-1}mol^{-1}$
9. Which of these compounds is a covalent compound? A. ZnS B. NaCl C. CsCl D.SiO_2 E.TiO_2
10. Metallic elements usually have ..... Structure
    A. open packed B. limited packet C. slight-packet D. close-packet E. ring packed

BIOLOGY

11. All except one are protists A. spirochaetes B. trypanosium C. paranecium D. chlamydomonas E. Diatoms
12. .....is not a green house gas
    A. carbon dioxide B. methane C. chlorofluorocarbon D. nitrods oxide E. hydrogen sulphide
13. Which of these ecosystem has the lowest primary productivity per square meter?
    A. salt marsh B. an open ocean C. a coral reef D. a grassland E. a tropical rain forest.
14. Homologous chromosome segregate toward opposite poles of a dividing cell during
    A. mitosis B. meiosis C. meisos II D. fertilization E. binary fission
15. Which organelle in paramecium is used for osmoregulation?
    A. cilia B. nucleus C. contralle vacusis D. oral groove E. pellicle
16. The shape of the chromosome is best studied during which phase in mitosis?
    A. prophase B. metaphase C. anaphase D. telophase E. cytokinesis
17. The formation of urine involves all except one
    A. ultra filtration B. selective reabsorption C. tubular secretion D. formation of metabolic by products
    E. small molecule pass through the walls of capillaries into the capsular space
18. Which of the following movements is seen in Hydra?
    A. swimming B. gliding C. looping D. crawling E. swaying
19. Nastic movements is in response to
    A. gravity B. directional stimuli C. non directional stimuli D. para tonic stimuli E. automatic stimuli
20. All are different types of ribonucleic acid except one A. transfer ribonucleic B. messenger acid
    C. ribosomal ribonucleic acid D. chromosomal ribonucleic acid E. options A and C

MATHEMATICS

21. Simplify $\frac{2^{n+1}-2^{n-1}}{2^{n+1}-2^n}$ A. $\frac{2}{3}$ B. $\frac{7}{2}$ C. $\frac{9}{2}$ D. $\frac{3}{2}$ E. $\frac{2}{5}$
22. Find the value of x if $3(2^x) = 24$. A 5 B. 2 C .7 D 8 E. 3
23. Find the value of K if the remainder when $3x^3+Kx^2-11x+12$ is divided by x-2 is 16. A. $-\frac{1}{2}$ B. $\frac{1}{2}$ C. $\frac{2}{3}$ D. $\frac{3}{2}$ E $\frac{2}{5}$
24. If $a = \frac{1}{2-\sqrt{3}}$ and $b = \frac{1}{2+\sqrt{3}}$ find the value of a^2+b^2 A.17 B. 14 C. 9 D. 7 E. 12
25. The product of 3 numbers in geometric progression is 720 find the second term. A. 12 B.7 C.5 D. 9 E.11

26. The sum of 3 numbers in arithmetic progression is 12 and the sum of their squares is 66 find the possible value of the common difference. A. 2 or $\frac{1}{3}$ B. 3 or $\frac{3}{4}$ C. 5 or $\frac{3}{4}$ D. 3 or $\frac{5}{2}$ E. 2 or 7

27. If SinA = $\frac{4}{5}$ and CosB = $\frac{12}{13}$ find the value of Sin(A +B) A. $\frac{63}{65}$ B. $\frac{23}{11}$ C. $\frac{61}{67}$ D. $\frac{5}{13}$ E. $\frac{12}{13}$

28. Simplify $\frac{2\frac{4}{5} \times 1\frac{1}{7}}{3\frac{1}{9} - 3\frac{3}{5}}$ A. $\frac{7}{2}$ B. $\frac{3}{5}$ C. $\frac{5}{7}$ D. $\frac{4}{9}$ E. $\frac{2}{7}$

29. How much will ₦200,00 amount to at 12% simple interest over 4 years.
A. ₦ 396,000 B. ₦ 296,000 C. ₦ 196,000 D. ₦ 396,000 E. ₦ 29,000

30. Find the arithmetic mean of 8, 3, 5, 12 and 10. A. 7.5 B. 9.3 C. 7.6 D. 11.5 E.13.5

USE OF ENGLISH

In questions 31 and 32 choose the option nearest in meaning to the underlined expression

31. The salesman tried to pull the wool over my eyes. This implies that the salesman tried to A. cover my eyes with wool his goods B. offer me cotton wool C, make me buy his wool D. dupe me E. cover my eyes with wool

32. Amaka counted her chickens before they are hatched. This means that Amaka
A. regarded each egg as a chicken B. hatched the eggs prematurely C. assumed that her expectations have already been realized D. protected her eggs from breaking E. insured the eggs

33. The military Governor upheld the decision of the cabinet.
A. held up B. undercut C. maintained D. abolished E. reversed

34. Many untrustworthy students give evasive answers to questions which they fully understand.
A. direct B. outspoken C. simple D. truthful E. clever

In question 35 and 36 choose the option nearest in meaning to the word(s) or phrase(s) underlined

35.He lost his voice momentarily.
A. in a moment B. in a split second C. for a brief period of time D. without delay E. instantly

36. The corrupt official has to leave the public service willy-nilly.
A. Unprepared B. reluctantly C. willingly D. compulsorily E. by retirement

In questions 37 and 38 choose the expression or word which best completes each sentence

37. The headmaster was interviewed in connection ,., the expansion project a to B. with C. for D. about E. at

38. What do you want me to do now? I'm ... withdrawing and keeping quiet. A. for. B. with C. up D. off E. on

Choose from the options the word that has the same vowel sound as the one represented by the letter(s) underlined

39. Research A. disturb B. comfort C. affair D. carry E. repeat

Select the word that has the same pattern of stress as the given word.

40. HONOUR A. Hostel B. hyena C. affair D. humane E. repeat

PHYSICS

41. An automobile travels along a straight road at a velocity of 150m/s a brake is applied and slows down to a velocity of 50m/s in 5sec, Determine the distance it travels at the end of 5sec. A. 50m B. 100m C. 25m D. 125m E. 225

42. A spring is compressed through a distance of 0.05m to store 75J of energy. What is the spring constant?
A. 15×10^4N/m B. 7.5×10^4N/m C. 5.0×10^4N/m D. 6.0×10^4N/m E.8.0×10^4N/m

43. Three 5 ohms resistors connected in parallel have a potential difference of 60V applied across the combination. The current in each resistor is A. 4A B. 36A C. 12A D. 24A E. 10A

44. A transformer has 300 turns of wire in the primary coil and 30 turns in the secondary coil. If the input voltage is 100volts, the output voltage is A. 5volts B. 10volts C. 15volts D. 20volts E. 25volts

45. A copper wire 20m long is heated from 20^0 to 70^0C if the linear expansivity of copper is 1.7×10^{-5}, calculate the increase in length. A. 0.017m B. 1.0m C. 17.00m D. 0.002m E. 1.72m

46. Which of the following relationship between superficial and cubical expansivities is correct
A. $2\beta=3y$ B. $\beta=2y$ C. $3\beta=2y$ D- $y=2\beta$ E. $\beta=3y$,

47. If two plane mirrors intersect at an angle of 60°, determine the images formed when an object is placed between them. A. 6 B. 5 C. 4 D. infinite E. 10

48. An optical pin is placed 10.0cm from the pole of a convex mirror of focal length 15.0cm. What is the magnification of the image produced. A. 0.6 B. 6.0 C 6.0cm D. 60 E. 60cm

49. The fundamental frequency produced by a violin string is 270Hz what is the frequency of the fourth harmonic produced by this string A. 270Hz B. 540Hz C. 810Hz D. 1080Hz E. 70Hz

50. The half-life of a certain radioactive nuclide is 9hours. If the original mass of the nuclide is 28kg determine the mass left after $1\frac{1}{2}$ days. A. 1.75kg B. 17.5kg C. 175kg D. 1.75g. E. 17.5g.

DAY 2 FUTO POST – UTME SCREENING 2014/2015 DETAILED SOLUTIONS

(1) $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$
1mol 2mol
; 1 mole of CH_4 requires 2 mole of O_2 ; To find the vol. of oxygen
$\therefore$ 2moles $= \frac{\text{volume occupied}}{22.4dm^3\ mol^{-1}}$ => Vol = $44.8dm^3$ .....(C)

(2) - (3) C (4) D (5) C (6) C (7) A (8) E (9) D (10) D

BIOLOGY

(11)A (12)E (13)A (14) B (15) C (16)B (17)E (18) C (19) C (20) D

Mathematics

(21) $\frac{2^{n+1}-2^{n-1}}{2^{n+1}-2^n} = \frac{2^n(2^1-2^{-1})}{2^n(2^1-1)}$ = 2- ½ = 3/2.....(D)

(22) $3(2^x) = 24$; $2^x = \frac{24}{3} = 8$; $2^x = 2^3$; $x = 3$.....(E)

(23) $f(2) = 16$; $3(2)3 + K(2)2 - 11(2) + 12 = 16$; $24 + 4K - 22 + 12 = 16$; $4k + 14 = 16$; $4k = 2$; $K = 1/2$....(B)

(24) $\left(\frac{1}{2-\sqrt{3}}\right)\left(\frac{1}{2-\sqrt{3}}\right) + \left(\frac{1}{2+\sqrt{3}}\right)\left(\frac{1}{2+\sqrt{3}}\right)$ => $\frac{1}{4-4\sqrt{3}+3} + \frac{1}{4-4\sqrt{3}+3}$; $\frac{1}{7-4\sqrt{3}} + \frac{1}{7+4\sqrt{3}}$; $\frac{14}{(7-4\sqrt{3})(7+4\sqrt{3})} = \frac{14}{1}$ .....(D)

(25) $\frac{a}{r}, a, ar$; $\frac{a}{r} \times a \times ar = 729$; $a3 = 729$; $a = 9$.....(D)

(26) Ans = + 3; No right options

(27) $Sin(A+B)$; $Sin\,A\,Cos\,B + sin\,B\,Cos\,A$; $Sin\,A = \frac{4}{5}$; $cos\,A = \frac{3}{5}$; $Sin\,B = \frac{5}{13}$; $cos\,B = \frac{12}{13}$

$\therefore \frac{4}{5} \times \frac{12}{13} + \frac{3}{5} \times \frac{5}{13} = \frac{63}{65}$.....(A)

(28) $\frac{\frac{14}{5} \times \frac{8}{7} \times \frac{5}{18}}{\frac{28}{9}} = \frac{8}{9} \times \frac{9}{28} = \frac{2}{7}$.....(E)

(29) $S.I = \frac{PRT}{100}$; $S.I = \frac{200{,}000\ X12\ X4}{100} = 96{,}000 = 96{,}000 + 200{,}000 = 296{,}000$.....(B)

(30) $mean = \frac{8+3+5+12+10}{5} = \frac{38}{5} = 7.6$.....(C)

English

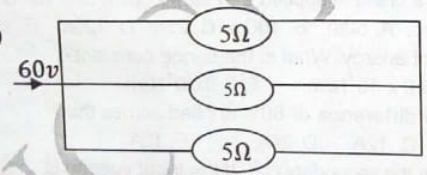
(31) D (32) C (33) C (34) E (35) C (36) D (37) B (38) D (39) A (40) B

PHYSICS

(41) STV

(42) $W = \frac{1}{2}Ke^2$; $K = \frac{2 \times W}{e^2} = \frac{2 \times 75}{0.05^2} = 6 \times 10^4$ N/m.....(D)

(43)



Since v across the resistors is same,
$I = \frac{V}{R} = \frac{60}{5} = 12A$.....(C)

(44) Np = 300; N_s = 30 ; Vp = 100; V_s = ? ; $\frac{Ns}{Np} = \frac{V_S}{V_P}$; vs = $\frac{N_S V_P}{N_P}$; $V_S = \frac{30X100}{300} = 10$.....(B)

(45) $l_2 - l_1 = \propto l_1(\theta_2 - \theta_1) = 1.7 \times 10^{-5} \times 20 \times 50 = 0.017$ .....(C)

(46) $\beta = 2\propto$; $\propto = \frac{\beta}{2}$; $\gamma = 3\propto$; $\propto = \frac{\gamma}{3}$; $\frac{\beta}{2} = \frac{\gamma}{3}$; $3\beta = 2\gamma$ ..... (C)

(47) $\frac{360^0}{n} - 1$; $n = 60^0$; $\frac{360}{60} - 1 = 5$.....(B)

(48) For convex mirror $-\frac{1}{F} = \frac{1}{U} - \frac{1}{V}$; $U = 10cm$; $F = 15cm$; $-\frac{1}{15} = \frac{1}{10} - \frac{1}{V}$; $\frac{1}{v} = \frac{1}{10} + \frac{1}{15}$

$\frac{1}{V} = \frac{1}{6}$; v = 6cm ; Magnitude = $\frac{v}{u} = \frac{6}{10} = 0.6$ ..... (A)

(49) Fundamental freq. $fo = 270Hz$; Freq of fourth harmonic $= 4f0 = 4 \times 270 = 1080H2$ ..... (D)

(50) Half life = 9hr ; 1½ days = 24 + 12 = 36hr ;

Kg	hrs
28	0
14	9
7	18
3.5	27
1.75	36

1.75 ..... (D)

DAY3 FUTO 2014/2015 POST – UTME SCREENING TEST TYPE M

FOR CANDIDATES OF ALL DEPARTMENTS IN SCHOOL SCIENCE (SOSC), MANAGEMENT TECHNOLOGY (SMAT), ENVIRONMENTAL(SOHT), AGRICULTURE AND AGRICULTURAL TECHNOLOGY(SAAT),HEALTH (SOHT) TIME:1Hr

Mathematics

1. Simplify $\sqrt{48} + \sqrt{75} - \sqrt{243}$ A.. 0 B. 3 C. 12 D. 1 E. 2
2. Find the value(s) of x if $2^{x^2+2} = 4$ A. 1 or 3 B. 1or 2 C. 1 or 2 D.5 E. 3 or 5
3. If log $(x^2+9) - 2\log x = 1$ find the value(s) of x A. 1 or 2 B. -1 or 3 C. 1 or- 2 D. 1 or- 1 E. 2 or 3. 4. When term of the arithmetic progression 2, 5, 8.... is 44. A. 5 B. 20 C. 25 D.16 E.15
5. If the numbers x, 2x +1, 5x - 1 are in arithmetic progression find the value of x.
   A ½ B. $\frac{2}{3}$ C. $\frac{5}{3}$ D. $\frac{2}{5}$ E. $\frac{3}{2}$
6. If α and β are the roots of the equation $3x^2 + 5x - 1 = 0$ find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
   A. $\frac{-21}{9}$ B. $\frac{-11}{7}$ C. $\frac{-31}{9}$ D. $\frac{-31}{9}$ E. $\frac{9}{5}$
7. Without using tables find the value of Cos 105° A. $\frac{\sqrt{3}}{4}(1 - \sqrt{3})$ B. $\frac{\sqrt{2}}{4}(1 - \sqrt{5})$ C. $\frac{\sqrt{2}}{4}(1 - 3)$ D. $\sqrt{3}$ E. $(1 - \sqrt{5})$
8. Simplify $\frac{\log 27 + \log 8 - \log 125}{\log 6 - \log 5}$ A. 5 B. 7 C. 3 D. 9 E. 25
9. What is the area of the sector which subtends angle of 30° at the centre of circle of radius 7cm.
   A. $\frac{11}{6}$ cm^2 B. $\frac{66}{5}$ cm^2 C. $\frac{79}{6}$ cm^2 D. $\frac{77}{6}$ cm^2 E. $\frac{77}{6}$ cm^2
10. If the scores 5, 8, 6, and 2 occur in a distribution with frequencies 3, 2, 4 and 1 respectively find the arithmetic mean of the scores. A. 5.7 B.15.2 C.16.2 D. 24 E.12

USE OF ENGLISH

In questions 11 and 12 choose the option nearest in meaning to the underlined expression

11. The convict said he was tired of leading a dog's life. To lead a dog's life means
    A. carelessly B. In disgrace C. In solitude D. In misery E. In poverty
12. He went through fire before he qualified as a doctor. The underlined expression means that he
    A .had a fire accident B. made a lot of fire C. Suffered a lot D. underwent some purification E. required a lot of fire

In questions 13 and 14 choose the option opposite in meaning to the word underlined

13. The increase in transport fares deterred our club from planning an excursion this year
    A. deferred B. irritated C. impelled D. restricted E. encouraged
14. This card entities you to attend the film show
    A. disqualifies B discourages C. disenchants D. proclaims E. Satisfies

In questions I5 and 16 choose the option nearest in meaning to the word(s) or phrase(s) underlined

15. I am yet to write the penultimate paragraph of my essay
    A. last but one B. third to the last C. second D. concluding E. introductory
16. Despite increasingly punitive laws against hemp smoking, it is still rising at an alarming rate
    A. Devastating B. exemplary C barbaric D. severe E. satisfactory

In questions 17 and 18 choose the oppression or word which best completes each sentence

17. I am looking ..... seeing your family. A. ahead at B. forward to C. forward on D. for to E. ahead to
18. I was seriously disappointed when the ... between the two teams ended in a goalless draw.
    A. march B. marsh C. match D. mash E. martcn

Choose from the options the word that has the same vowel sound as the one represented by the letter(s) underlined)

19. Blood A. bookB. block C. Stock D. money E. took

Select the word that has the same pattern of stress as the given word

20. QUALITY A. guarantee B. accepted C. bachelor D. relation E. again

PHYSICS

21. A force of 150N is attached to a mass of 200kg at an angle of 30° to drag it through a horizontal distance of 10m. How much work is done by the force A. 1200J B. 1300J C. 2000J D.1299J E.1290J.
22. A uniform meter stick is supported at the 25cm mark and maintained at equilibrium by a 10kg mass which is attached at 5cm mark. The mass of the meter rule is A. 20kg B. 10kg C. 5kg D. 8kg E. 6kg
23. A 6μf capacitor is connected in series with a 5μf and 7μf which are connected in parallel. What is the equivalent capacitance of the network A. 18μf B. 4μf C. 2μf D.12μf E.13μf

24. When two parallel wires carry currents in opposite direction, the force on either wire is
A. away from the other wire B. zero, because the currents cancel each other C. twice as much as when the currents are in the same D. towards the other wire E. None of the above
25. Some quantity of hot water at a temperature T is added to warm water at a temperature of 25^0C in the ratio 1:4. Determine T if the final temperature of the mixture is 30
A. 50^0C B.35^0 C. 55^0C D. 5^CC E.10^0C
26. When the saturated pressure of a liquid becomes equal to the pressure of the air above it. A. The liquid boils B. The liquid evaporates C. Dew begins to form D. The liquid condense E. None of the above
27. Calculate the angle of incidence that will produce an angle of refraction of 36° for a light ray incident on glass if the velocities of the light in air and glass one 3.0×10^8m/s and 2.0×10^8rn/s respectively
A.72° B. 36° C.180^C D. 61.8^0 E. 90^0
28. An object is placed 30.0cm from a converging lens of focal length 12.0cm. Calculate the height of the object if the image formed is 4.0cm high A.20cm B.20m C. 200cm D. 6.0cm E.4.0cm
29. What is the length of an organ pipe open at both ends which will produce the some fundamental note as a 75cm organ pipe closed at one end A. 75cm B. 37.5cm C. 150cm D. 750cm E. 7.5cm
30. When a metal surface is irradiated by ultra – violet rays of wavelength 1200A, electrons with maximum kinetic energy of 4ev are ejected. Calculate the work function of the metal
A. 10.36ev B. 4ev C. 63ev D.63.ev E.6 .36ev

CHEMISTRY

31. Which of the following is isotopes of hydrogen A.^4_1H B. ^5_1H C. ^3_1H D. ^6_1H E. ^7_1H
32. Can hydrogen be used to reduce the oxide of Na? A. No B. Partial C. Yes D. insufficient E. Limited
33. The term atomic orbital refers to.....
A. circular path B. elliptical path C. an energy level D. a volume of space E. a valence shell
34. Which of these techniques are available for isolation and purification of compound
A. recrystalization B. halogenation C. homogination D. hexagonation E. hydration
35. Which of the following does not represent alkane A. C_6H_{14} B. $C_{13}H_{2B}$ C. $C_{18}H_{36}$ D. $C_{19}H_{40}$ E. $C_{38}H_{78}$
36. The higher homologues of alkanes are solids at A. 20^CC B.-30^oC C.-20^0C D. 30^OC E.-10^0C
37. Calculate the oxidation number of Mn in MnO_2 A. 6 B. 4 C. 2 D.8 E. 10
38. How many moles are there in 7.20g of H_2O A. 0.20 B. 0.80 C. 0.60 D. 0.40 E. 0.10
39. Which of these is not a physical property of metal?
A. electrical conductivity B. instre C. ductile D. malleable E. resistant
40. How many straight-chain dichloroalkanes correspond to the formula $C_4H_SCl_2$
A. 4 B. 5 C. 6 D.7 E. 8

BIOLOGY

41. What part of prawn is used specifically for sensory
A. carapace B. mandible C. tracheae D. proboscis E. antennae
42. The excretory organ of an earthworm is called .....
A. nephridia B. flame cell C. malphiligan tabule D.chloragogenus cells E. kidney
43. Which of the following is not an essential nutrient for human?
A. vitamin A B. lysine C. glucose D. calcium E. iron
44. A typical animal cell consists of all except
A. chloroplast B. nucleus C. cell wall D. protoplasm E. cytoplasm
45. Malpighian tubules are excretory organs found in
A. vertebrate B. insects C. flatworms D. annelids E. jelly fish
46. Which base replaces thymine (T) in base sequence of messenger RNA (mRNA)?
A. Adenine (A) B. guanine (G) C. Cytocine (C) D. Uracil (U) E. both Guanine and cytocine
47. Which vertebrae maintains the right and proper gait of the body?
A. caudal vertebrae B. lumber vertebrae C. sacral vertebral D. axis vertebral E. cervical vertebra
48. A fruit is most commonly A. a mature ovary B. a thickened style C. an enlarged ovule D. a modified root E. a mature female gamatophyte
49. Which of the following is not recycled in an ecosystem?
A. water B. energy C. carbon D. nitrogen E. all
50. Movement of substance across cell membrane is controlled by the
A. size of permeating particle B. permeability of membrane C. membrane proteins D. both B and C E. all

DAY 3 FUTO POST – UTME SCREENING 2014/2015 DETAILED SOLUTIONS

MATHEMATICS

1. $\sqrt{48}+\sqrt{75}-\sqrt{243}$

$\sqrt{16\times3}+\sqrt{25\times3}-\sqrt{81\times3}$

$4\sqrt{3}+5\sqrt{3}-9\sqrt{3}=0$ ..... **(A)**

2. $2^{x^2+2}=4$

$2^{x^2+2}=2^2$; equating powers we have $x^2+x=2$

$x^2-x+2x-2=0$;

$x(x-1)+2(x-1)=0$

$x=1,-2$ ..... **(C)**

3. $\log(x^2+9)-2\log x=1$

$$\log\left(\frac{x^2+9}{x^2}\right)=\log 10$$

$10x^2=x^2+9$; $x=\pm1$ ..... **D**

4. $a=2;\ d=3$

$Tn=a+(n-1)d$; $44=2+(n-1)3$

$\frac{42}{2}=n-1$; $n=15$ ..... **E**

5. $T_2-T_1=T_3-T_2$

$2x+1-x=5x-1-2x-1$

$x-1=3x-2$; $x=½$ ..... **(A)**

6. $3x^2+5x-1$

$a=3;\ b=5;\ c=-1$

$$\alpha+\beta=\frac{-b}{a};\ \alpha\beta=\frac{c}{a}$$

$$\frac{\alpha^2+\beta^2}{\alpha\beta}=\frac{b^2-2ac}{ac}$$

$$=\frac{25+6}{-3}=\frac{-31}{3}$$ ..... **D**

7. $Cos\ 105^0=cos\ (60+45)$

$=cos60cos45-sin60sin45$

$$\frac{1}{\sqrt{2}}\times\frac{1}{2}-\frac{\sqrt{3}}{2}\times\frac{1}{\sqrt{2}}=\frac{1-\sqrt{3}}{2\sqrt{2}}\times\frac{2\sqrt{2}}{2\sqrt{2}}$$

$$=\frac{2\sqrt{2}-2\sqrt{6}}{8}=\frac{\sqrt{2}}{4}(1-\sqrt{3})$$ ..... **C**

8. $\frac{Log\ 27+log\ 8-log\ 125}{Log\ 6-log\ 5}$

$$\frac{3Log\ 3+3\ log\ 2-3\ log\ 5}{Log\ 6-log\ 5}$$

$$\frac{3(Log\ 6-log\ 5)}{(log\ 6-log\ 5)}=3$$ ..... **C**

9. $\frac{\theta}{360}\times\pi r^2$ =>

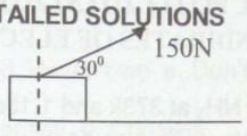
$\frac{30}{360}\times\frac{22}{7}\times7\times7=77cm^2$ ..... **E**

10. $\frac{(5\times3)+(8\times2)+(66\times4)+(2\times1)}{10}=5.7$ ..... **(A)**

USE OF ENGLISH

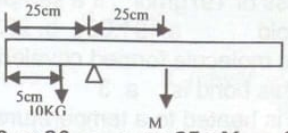
11. D 12. C 13. E 14. A 15. A
16. D 17. B 18. C 19. D 20. D

PHYSICS



21. $Work=F\cos30\times distance$

$=150\cos30\times10=1299N$ ..... **(D)**

22. 

$10\times20=m\times25$; $M=8kg$ ..... **(D)**

23. $\frac{1}{6}+\frac{1}{(5+7)}=\frac{1}{6}+\frac{1}{12}$; $\frac{1}{C}=\frac{3}{12}$; $C=4\mu f$ ..... **(B)**

24. A

25. $Ratio=1:4$; $Final\ T=30^0C$

$25\times4=100$; $x+1=x$

$$30=\frac{(x+100)}{5};\ x=50^0C$$ ... **(A)**

26. A

27. $Refractive\ index=\frac{V_a}{v_g}=\frac{3}{2}=1.5$

$$1.5=\frac{sin\ i(in\ air)}{Sin\ r(in\ glass)}=\frac{sin\ x}{sin\ 36}$$

$i=61.8^0\ C$ ..... **(D)**

28. $\frac{Image\ height}{Object\ height}=\frac{image\ distance}{object\ distance}$;

$U=30;\ F=12$

$$\frac{1}{V}+\frac{1}{U}=\frac{1}{F}\quad=\frac{1}{V}+\frac{1}{30}=\frac{1}{12}$$

$$=\frac{1}{V}+\frac{5-2}{60}=\frac{3}{60}=\frac{1}{20}$$

$V=20$; $\frac{x}{4}=\frac{30}{20}=x=6cm$ ..... **(D)**

29. $Closed\ at\ one\ end=75cm$

$Open\ at\ both\ end, L=?$

$L_1=\frac{\lambda}{4}$; $L_2=\frac{\lambda}{2}$

$4L_1=2L_0=\lambda$

$L_0=2L_c=2\times75=150cm$ ..... **C**

CHEMISTRY

31. C 32. C 33. C
34. A 35. C 36.
37. B 38. D 39. E
40. A

BIOLOGY

41. E 42. A 43. B 44. A 45. B
46. D 47. E 48. A 49. B 50. B

DAY 1 FUTO 2013/2014 POST UTME SCREENING TYPE P TIME: 1 HOUR

FOR CANDIDATES OF ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

CHEMISTRY

1. Density of NH_3 at 373k and 1.15atm pressure is (R= 0.082atm-dm^{-3}/$_{k-mol}$)
   a. 0.56gdm^{-3} b. 1.56gdm^{-3} c. 5.26gdm^{-3} d. 3.56gdm^{-3} e.0.26gdm^{-3}
2. Calculate the number of moles of chlorine contained in 3.52 x10^{24}atoms.
   A. 6.46moles b. 5.85moles c. 3.74moles d. 8.45 moles e. 4.85 moles
3. Gold has a molar mass of 197gmol^{-1}. If a sample of it contains 9.70 x 10^{23} atoms, what is the mass of this sample of gold a.191.09g b. 203.09g c. 122.30g d. 185.35g e. 317.32g
4. Nitrogen is a diatomic molecule formed covalently by sharing electrons. The number of electrons shared to form this bond is a. 3 b. 2 c. 6 d. 5 e. 4
5. 2000L of gas at 20^{0}c is heated to a temperature of 35^{0}c, its final volume is
   a. 1500L b. 2102.3L c. 1805.2L d. 3205.1L e. 2105.2L
6. How many grams of HBr would exactly be required to react with 2g of propyne? (C=12, H=1, Br = 80)
   a. 4.1g b. 6.1g c. 10.1g d. 8.1g e. 16.2g
7. If an organic compound decolorizes bromine water then the compound is
   a. Saturated b. Super saturated c. Unsaturated d. Solid e. Protonated
8. How much of magnesium is required to react with 250cm^3 of 0.5m HCl?
   a. 0.3g b. 1.5g c. 2.4g d. 3.0g e. 2.5g
9. The densities of two gases, x and y, are 0.5gdm^{-3} and 2.0gdm^{-3} respectively. What is the rate of diffusion of x relative to y? a. 0.1 b. 0.5 c. 3.0 d. 4.0 e. 2.0
10. What volume of 1.5m solution of KOH would contain 0.045 moles?
    a. 67.50cm^3 b. 30.00cm^3 c. 6.75cm^3 d. 3.00cm^3 e.20.00cm^3

BIOLOGY

11. Root hairs are developed from the
    a. Root apex b. Epidermis of root c. Vascular bundles d. Endodermis e. Pericycle
12. In the onion bulb, food is stored in the
    a. Stem b. Lateral buds c. Cotyledons d. Outer scale leaves e. Leaf bases
13. Mycelium is a characteristic feature of
    a. Mosses b. Moulds c. Hydra d. Bacteria e. Yeast
14. What is the probability of producing a child of blood group "O" by a woman of blood group "O" and a man of blood "A"? a. 50% b. 25% c. 20% d. 75% e. 100%
15. The part of the nervous system that interprets blinking of the eyes is the
    a. Hind brain b. Cerebellum c. Cerebrum d. Spinal cord e. Olfactory lobe
16. If a DNA strand has a base sequence AGT, its complementary strand must be
    a.TCA b. CAT c. TAG d. ATG e. AGC
17. Animal saprotrophs are called
    a. Saprophytes b. Mucorheimalis c. Saprophytism d. Lichens e. Saprozoites
18. The blue-green algae belongs to the kingdom
    a. Plantae b. Mycophyta c. Monera d. Bryophyta e. Pteridophyta
19. Partially digested food ready to leave the stomach is referred to as
    a. Curd b. Glycogen c. Paste d. Chyme e. Roughage
20. Which of the following organs regulate the amount of amino acids and glucose in the body?
    a. Kidney b. Liver c. Pancreas d. Spleen e. Stomach

USE OF ENGLISH

21. Obi and ---------- participated in the tournament
    a. Him b. His c. He d. Her e. Hers
22. Emeka is one of the boys who always ----- good work.
    a. Does b. Would do c. Done d. Should do e. Do
23. The policemen who were to keep watch connived ------- robbers to escape.
    a. With b. At c. To d. For e. As
24. He claimed that Mr Okoli's utterance was tantamount to defamation of character, so he sued for ------
    a. Damage b. Some damage c. A damage d. Damages e. Damages'

25. The teacher with his wife ------- here.
a. Were b.Were to be c. Are d. Was e. are to be

26. We ought to have visited the Governor, ------?
a. Isn't it b. Oughtn't we c. Shouldn't we d. Haven't we e. Don't we

27. The class---------- more girls than boys this session.
a. Comprised of b. Comprises of c. Comprise d. Comprises e. Consists

28. By twelve midnight, we will be -------- en route to Britain.
a. Airbourned b. Airborne c. Air borned d. Airbourne e. Air bourned

29. My friend's car has -------- to a halt.
a. Grinded b. Grounded c. Ground d. Grind e. Grinding

30. The match gave the team a chance to show their ----------.
a. Worth b. Position c. Prowess d. power e. mettle

MATHEMATICS

31. The binary operation * is defined on the set of integers such that x+y = xy +x-y. Find 2* (3*4).
a.11 b. 13 c. 25 d. 22 e. 23

32. Evaluate $\int_0^{\frac{\pi}{2}} \sin 2x\, dx$
a. π b. 2π c. 1 d. 10 e. 3

33. Find x if $\log_x 9 + log_{x^2} 3 = 2.5$
a. 2 b. 3 c. 4 d.2.5 e. 1

34. Find the values of a if the equation $(5a+1)x^2 - 8ax + 30 = 0$ has equal roots
a. (-3,0) b. (3,0) c. (2,3) d. (-2,3) e. (-2,-3)

35. What is the value of k if (x-3) is a factor of $2x^3 + kx^2 - 5x + 6$.
a. -5 b. 5 c. -45 d. 6 e. -6

36. If the angles of hexagon are x^0, $(x+10)^0$, $(x+20)^0$$(x+30)^0$, $(x+40)^0$ and $(x+50)^0$ then x is
a. 95^0 b. 120^0 c. 90^0 d. 65^0 e. 45^0

37. Simplify $(225^{1/2} + 85^0) \times 256^{-1/4}$
a. 2 b. 4 c. -2 d.-4 e. 1

38. Find the turning point of the functions $2x^3 + 3x^2 - 36x + 10$
a. (2,3) b.(-2,3) c. (2,-3) d.(-2,3) e. None of the above

39. In how many ways can 3 boys and 2 girls sit in a row, if just the girls are to sit together?
a. 120 b. 24 c. 48 d. 36 e. None of the above

40. The value of $\lim_{x\to 0} \frac{1-\cos x}{1-\sin x}$ is a. 1 b. 0 c.-1 d.0.5 e. 2

PHYSICS

41. A car travelling at 50km/hr decelerates uniformly at $1.8m/s^2$. Calculate the distance it travels before it stops. a.1.80m b. 50.0m c. 53.59m d.55.39m e. 5.35m

42. A body of mass 50kg slides down freely on a frictionless plane which is inclined at an angle of 30^0 to the horizontal. What force is pushing the body down the incline?
A. 542N b.200N c.245N d. 50N e.30N

43. A 15g bullet travelling at $100m/s$ strikes and is absorbed by a 75kg object. Find the speed at which the final object moves. A. $75.015m/s$ b. $75m/s$ c. $100m/s$ d. $0.02m/s$ e.$50.01m/s$

44. A car moves at a uniform speed of $40m/s$, if the force exerted by the engine on the car is 4000N, what is the power of the automobile? A. 114hp b. 214hp c. 314hp d.514hp e.414hp

45. In a hydraulic press, the pump piston exert a pressure of 100 Pa on the liquid. What force is exerted in The second piston of cross-sectional area $3m^2$? A.300N b. 200N c. 150N d. 100N e.600N

46. A sealed flask contains $600cm^3$ of air at 27^0c. It is heated to 35 c at a constant pressure. The new volume of air is a. $508cm^3$ b. $516cm^3$ c. $608cm^3$ d.$603cm^3$ e.$616cmcm^3$

47. A real image three times the size of an object is formed 24cm from a converging mirror. What is the focal length of the mirror? A. 6cm b. 8cm c. 12cm d. 16cm e. 24cm

48. An electrical device is rated 1500W and its resistance is 375 ohms. The current it will draw is
a. 0.10A b. 4.00A c. 0.40A d. 77.50A e.2.00A

49. Three inductors of inductances 5mH, 10mH and 20mH are connected in series. The effective inductance is: a. 2.90mH b. 0.35mH c. 3.5mH d. 35.00mH e. 29.0mH

50. The amount of energy released when 0.5kg of uranium is burnt completely is
a. 4.5×10^{16}j b. 1.5×10^{16}j c. 1.5×10^{8}j d. 4.5×10^{18}j e.4.5×10^{8}j

DETAILED SOLUTIONS TO DAY 1 TYPE P FUTO POST UTME APTITUDE TEST 2013/2014

CHEMISTRY

1. Density of NH_3=? ; Temperature=373k
   Pressure = 1.15atm
   R=0.082atm-dm^{-3}/k-mol
   Molar Mass of NH_3= (14+3)=17$gmol^{-1}$

$$= \frac{\frac{373k}{1.15atm} x \frac{0.082atm}{dm^3 kmol}}{17gmol^{-1}}$$

$$= \left(\frac{26.5965}{17}\right) gdm^{-3}$$

= 1.56gdm^{-3}------(**B**)

2. 1 mol of Cl contains 6.02 x 10^{23} atoms
   x mol of Cl contains 3.52 x 10^{24} atoms

$$x = \frac{9.7x10^{24}}{6.02\ x\ 10^{23}} = 5.85\text{moles} \text{ ----- (B)}$$

3. Molar mass of gold is 197$gmol^{-1}$.
   A sample containing 9.70 x 10^{23} atoms
   but, I mole of gold = 6.02 x 10^{23} atoms
   X mole of gold= 9.70 x10^{23}

$$x = \frac{9.7\ x\ 10^{23}}{6.02\ x\ 10^{23}} = 1.6 \text{ moles} = n$$

$$N = \frac{mass\ in\ g}{molar\ mass}$$

Mass in g = n x molar mass
1.6x 197 = 317.32 ----- (**E**)

4. 5..... (**D**)
5. initial volume V_1 = 2000L;
   initial temperature T_1 = 20^0C =293k
   final temperature T_2 =35^0C = 308k
   final vol. V_2 = ?

$$= \frac{v_1}{t_1} = \frac{v_2}{t_2} \rightarrow \frac{2000}{293} = \frac{v_2}{308}$$

$$V_2 = \frac{2000\ x\ 308}{293} = \frac{61600}{293} = 2102.4L \text{ --- (B)}$$

6. 8.1g ---------- (D)
7. One of the test for unsaturation ----------(**C**)
8. First the equation of reaction
   $Mg + 2HCl \rightarrow MgCl_2 + 2H$
   1 : 2 1 : 2
   C_A = 0.5m , V_A = 250cm^3
   0.5m → 250cm^3 ; Xm → 1000cm^3

$$x = \frac{1000\ x\ 0.5}{250} = 2m$$

24g→ 2(1+ 35.5)
xg→ 2 → $x = \frac{2\ x\ 24}{7} = 0.658g$

9. $\frac{R_x}{R_y} = \sqrt{\frac{dy}{dx}} \rightarrow \frac{R_x}{R_y} = \sqrt{\frac{2.0}{0.5}} \Rightarrow \frac{R_x}{R_y} = \sqrt{4} = 2$ -- (E)
10. $C = concentration = 1.5m$
    V = volume =?
    N = no of moles = 0.045m
    But C = $\frac{N}{V\ (in\ litres)}$

$$\Rightarrow 1.5 = \frac{0.045}{v} \Rightarrow V = \frac{0.045}{1.5} = 0.003L$$

0.03L = (0.03 x 1000)cm^3 = 30cm^3------(B)

BIOLOGY

11. Epidermis of roots ..... B
12. Outer scale leaves ..... D
13. Bacterial .....D
14. 100% ..... E
15. Spinal cord ..... D
16. 17) saprophytes ..... A
18) pteridophyta.....E
19) chyme .....D
20) liver .....B

USE OF ENGLISH

21) him.....A
22) does .....A
23) with .....A
24) damages .....D
25) are.....C
26) oughtn't we .....B
27) comprises of .....B
28) airbourne.....D
29) grounded .....B
30) prowess.....C

MATHEMATICS

31. Given: x + y = xy + x-y to find 2*(3*4)
    3*4 = (3x4) + 3-4 = 12+3-4 = 3*4 =11
    2*(3*4) = 2*11 = (2x11) +2-11 = 2*11
    = 22+2-11 = 13 --------(B)

32. $\int_0^{\pi/2} \sin 2x\, dx = \left[\frac{-\cos 2x}{2}\right]_0^{\pi/2}$

$= \left[\left[\frac{\cos 2(\frac{\pi}{2})}{2}\right] - \left[\frac{\cos 2(0)}{2}\right]\right]$

$= -0.4998+0.5 = 0.0002$

33. $\log_x 9 + \log_{x^2} 3 = 2.5$

$\Rightarrow \log_x 3^2 + \log_{x^2} 3 = 2.5 = \log_x 3^2 + \frac{1}{2}\log_x 3$

$= {}^5/_2$

$= \log_x 3^2 + \log_x 3^{1/2} = \frac{5}{2} \Rightarrow \log_x(3^2 \times 3^{1/2}) = {}^5/_2$

$= \log_x(3^{2+1/2}) = \frac{5}{2} \Rightarrow x^{5/2} = 3^{5/2}$

Canceling out powers; x = 3 ----------(B)

34. For equal roots; $b^2 - 4ac = 0$

$\therefore a = (-2,3)$ -------(D)

35. If (x-3) is a factor of $2x^3 + kx^2 - 5x + 6 = 0$

X= 3

$2(3)^3 + K(3)^2 - 5(3) + 6 = 0$

$\Rightarrow 54 + 9K - 15 + 6 = 0$

$45 + 9K = 0 \Rightarrow K = \frac{-45}{9} = -5$ ------- (A)

36. 95^0 ----------(A)

37. $(225^{1/2} + 85^0) \times 256^{-1/4}$

$\Rightarrow \sqrt{225} + 85^0 \times \frac{1}{\sqrt[4]{256}}$

$= 15 + 1 \times \frac{1}{4} \Rightarrow 16 \times \frac{1}{4} = 4$ ---------- (B)

38. $2x^3 + 3x^2 - 36x + 10$

has turning points 2 and -3....(C)

39. Let ABC be the boys

Let DE be the girls

A,B,C,D,E represents the row

For the girls to sit together we will have 4 fixed positions and only two possible points for the two girls to sit together

ABC↑D↑; hence 4! x 2 = 24 x 2 = 48 -----(C)

40. $\frac{1-\cos(0)}{1-\sin(0)} = \frac{1-1}{1-0} = \frac{\sin 0}{\cos 0} = 0$

$\lim_{x\to 0} \frac{dy}{dx} \frac{1-\cos x}{1-\sin x} \Rightarrow \frac{\sin x}{-\cos x} \Rightarrow \frac{\sin 0}{-\cos 0} = 0$ ----(B)

PHYSICS

41. V=50km/ hr = $\frac{50 \times 1000}{3600}$ = 13.89 m/s

a =1.8m/s^2 d=? but $d = \frac{v^2}{2a} =$

$\frac{(13.89)^2}{2(1.8)} = \frac{192.9}{3.6}$ $53.59m$ .....(c)

42. 245N ----------(C)

43. m_1= 15g , v_1 = 100m/s , m_2 = 75kg, v_2 = ? -----(**D**)

44. V = 40m/s , F=400N , P = ?

but $P = \frac{work\ done}{time} = \frac{f \times d}{t}$

= f x v = 40 x 4000 =160,000W;

But 1hp = 746w

xhp=160,000W = P = $\frac{160000}{746}$ = 214.48hp -(B)

45. P=100pa ; F=? ; A=3m^2 => $P = \frac{F}{A}$

=> F = P x A = 100 x 3 =**300N**

46. V_1= 600cm^3 ; T1 = 27^{0}c = 300k ;

T2 = 35^{0}c = 308k V2 = ?

$\frac{v_1}{t_1} = \frac{v_2}{t_2} \Rightarrow v_2 = \frac{600 \times 308}{300}$

$= v_2 = 616\ cm^3$ ----------(E)

47. 8cm ----------(B)

48. P = 1500W ; R = 375Ω

But $P = I^2R \Rightarrow I = \sqrt{\frac{p}{R}} = \sqrt{\frac{1500}{375}}$

= 2A -------(E)

49. For serial connection = $\frac{1}{5} + \frac{1}{10} + \frac{1}{20}$

$= \frac{4+2+1}{20} = \frac{7}{20}$ = 2.90mH ---------- (A)

50. 4.5×10^{-16}j ---------- (A)

Over the years, this preparation technique has been tested and proven to work.

1. Organize your time. This you can do by doing one thing at a time. Do not put two fists in one mouth.
2. Organize your study materials. These study materials include
   i. Personal notes or secondary school notes.
   Ii. Text books
   iii. Jamb and post jamb past questions.
3. Make a study area. Your study area should be comfortable so that you can concentrate, but not too comfortable so that you sleep off.
4. Set goal for each study session / subject.
5. Use questions as introductions to studies. At this point of the study, it will be superfluous to start reading the text book chapter by chapter. Simply follow the suggestion below:
   i. Use the past question and answers
   ii. After question, look up the answers at the answers page
   iii. Then refer to the chapter covering and reading up every other detail there on the topic.
   iv. Try finding out the meaning of the other options. You might just see them as other questions.

Day 2 FUTO 2013/2014 POST UTME SCREENING TYPE R TIME: I HOUR

FOR CANDIDATES OF: MATERIAL AND METALLURGICAL, CIVIL, POLYMER AND TEXTILE, PETROLEUM, CHEMICAL, MECHANICAL AND AGRICULTURAL ENGINEERING DEPARTMENTS

CHEMISTRY

1. A gas occupies $30.0dm^3$ at S.T.P. what volume would it occupy at 91^0c and 380mmHg?
   A. $20.0dm^3$ B. $40.0dm^3$ C. $60.0dm^3$ D. $80.0dm^3$ E. $100.0dm^3$
2. $28.8cm^3$ of nitrogen at 150c is cooled to 0^0c at constant pressure, the new volume of nitrogen is
   A. $17.4cm^3$ B. $14.7cm^3$ C. $27.3cm^3$ D. $31.7cm^3$ E. $34.7cm^3$
3. IF the molar mass of x is 36g, the number of moles of x dissolved at 343k is
   A. 0.2 moles B. 0.7 moles C. 1.5 moles D. 2.0 moles E. 3.0 moles
4. If $24.83cm^3$ of 0.15M NaOH is titrated to its end point with $39.45cm^3$ 0f HCl, what is the morality of the HCl? A. 0.094M B. 0.150M C. 0.940M D. 1.500M E. 0.091M
5. What volume of a 0.1M H_3PO_4 will be required to neutralize $45.0cm^3$ of a 0.2M NaOH?
   A. $40.0cm^3$ B. $10.0cm^3$ C. $20.0cm^3$ D. $27.0cm^3$ E. $30.0cm^3$
6. What is the concentration of H^+ ions in moles per dm^3 of a solution of pH 4.398?
   A. 4.0×10^{-5} B. 0.4×10^{-5} C. 4.0×10^{-3} D. 0.4×10^{-3} E. 0.4×10^{-2}
7. What volume of 11.0M hydrochloric acid must be diluted to obtain 1 dm^3 of 0.05M acid?
   A. $0.05dm^3$ B. $0.10dm^3$ C. $0.55dm^3$ D. $11.0dm^3$ E. $0.15dm^3$
8. A given mass of gas occupies $2dm^3$ at 300k. At what temperature will its volume be doubled keeping the pressure constant? A. 400k B. 480k C. 550k D. 600k E. 500k
9. How many moles of oxygen molecules would be produced from the decomposition of 2.5 moles of potassium trioxochlorate (V)? A. 2.50 B. 3.50 C. 3.75 D. 7.50 E. 2.75
10. The carbon atoms of ethane are A. Sp^2 hybridized B. Sp^3 hybridized C. Sp^2d hybridizes D. Sp hybridized E. Sd hybridized

PHYSICS

11. A stone is thrown with a velocity of $50m/s$ upwards from a point 20m above the ground, when does the stone reach its maximum height? A. 0.51s B. 9.8s C. 5.1s D. 5.0s E. 5.2s
12. A simple pendulum with a period of 2.0s has its length doubled its new period is
    A. 4.00s B. 2.83s C. 0.35s D. 1.00s E. 1.41s
13. A rope is being used to pull a mass of 10kg vertically upward. Determine the tension in the rope if starting from rest, the mass acquires a velocity of $4ms^{-1}$ in 8s.
    A. 5N B. 95N C. 50N D. 105N E. 40N
14. How long will it take a 60kg man to climb a height of 22m if he expended energy at the rate of 0.25KW? A. 52.8s B. 5.3s C. 34.5s D. 41.6s E. 52.2s
15. Hot water is added to three times its mass of water at 10^0c and resulting temperature is 20^0C. What is the initial temperature of the hot water?
    A. 40^0C B. 50^0C C. 80^0C D. 100^0C E. 30^0C
16. If the refractive index of a medium is 2, what is its critical angle?
    A. 45^0 B. 30^0 C. 60^0 D. 25^0 E. 15^0
17. The energy stored in a capacitor of capacitance 5 microfarad is 40J. What is the voltage applied across its terminals? A. 4V B. 6V C. 200V D. 16V E. 4000V
18. The energy stored in an inductor of inductance 5mH when a current of 6A flows through it is
    A. 1.8×10^{-2} J B. 9.0×10^{-2}J C. 9.0×10^{-3}J D. 1.4×10^{-2}J E. None of the above
19. The wavelenght of the first overtone of a note in a closed pipe of length 33cm is
    A. 17cm B. 22cm C. 44cm D. 33cm E. 11cm
20. The half-life of a radioactive element is 9 days. What fraction of atoms has decayed in 36 days?
    A. $\frac{1}{4}$ B. $\frac{1}{16}$ C. $\frac{1}{2}$ D. $\frac{15}{16}$ E. $\frac{3}{18}$

MATHEMATICS

21. Find the identity element of the set S under the binary operation * defined by a *b = 2ab
    A. $\frac{1}{2}$ B. 1 C. 0 D. $^1/_2$ E. -1
22. Differentiate $y = 7x^4 \cos x - 5$ with respect to x

A. $28x^4 + \sin x$ B. $28x^4 - \cos x$ C. $28x^3 - \sin x$ D. $28x - \sin x$ E. $28x^5 - \sin x$

23. Find the value of n if $30x\ ({}^nC_5) = {}^nP_4$ A. 5 B. 2 C. 3 D.6 E.8

24. What value of x satisfies the equation $3^{2x+3} - 3^{x+2} - 3^{x+1} + 1 = 0$

A. (-2, -1) B. (2, 1) C. (-2, 1) D. $(\frac{1}{9}, \frac{1}{3})$ E. (0,1)

25. What is the quotient and remainder when $x + 2$ divides $2x^2 - 3x + 2$?

A. (x + 2, 16) B. (x + 2, 2x – 7) C. (2x – 7, 16) D. (2x + 7, 16) E. (2x + 7, 16)

26. What is the point of intersection between the lines $y = 3x + 2$ and $2x + 3y = 17$?

A. P(1,5) B. P(5,1) C. P(2,3) D. P(2,17) E.P(-1, -5)

27. Evaluate $(2^0 + 4^{-\frac{1}{2}})^2$ A. 2 B. 4 C. $\frac{9}{4}$ D.5 E.1

28. If $\cos\theta = \sin\theta$ then θ is A. 30^0 B. 45^0 C. 60^0 D.90^0 E. 0^0

29. What is the probability of obtaining a total of 5 or 11 when a die is cast twice?

A. $\frac{1}{6}$ B. $\frac{1}{9}$ C. $\frac{1}{18}$ D. $\frac{1}{12}$ E. None of the above

30. What is the first derivation of $\frac{3+2x-x^2}{6}$ A. $\frac{1}{3}(1 - x)$ B. $\frac{1}{3}(1 + x)$ C. $\frac{1}{3}(x - 1)$ D. $\frac{1}{3}(x - 2)$ E. $\frac{1}{3}(1 + x)$

USE OF ENGLISH LANGUAGE

31. Four engineers --------- on the system since March.

A. Worked B. Are working C. Had worked D. Have been working E. Has been working

32. I sent ---------- news to the press yesterday.

A. Parcel B. A flash C. A number D. A parcel E. An item

33. The police -------- happy about the dwindling crime rate.

A. Says they are B. Say it C. Says it is D. Say they are E. Says you are

34. The workers suffered a lot, toiling ---- the sun. A. In B. Under C. Underneath D. Inside E. On

35. He is one of those who ---------- in my school.

A. Teaches B. Is teaching C. Are teaching D. Has taught E. Teach

36. Those men helped Ngozi and ----------

A. Myself B. I C. Me D. We E. He

37. A university teacher is an ----------

A. Academic B. Academics C. Academician D. Academia E. None of the above

38. It is high time we ---------- home.

A. Go B. Went C. Are going D. Gone E. Have gone

39. If one perseveres ---------- will surely succeed. A. She B. One C. He D. They E. It

40. By this time next year, I ---------- twenty years old.

A. Would have been B. Will be C. Could have been D. Will have been E. Could be

BIOLOGY

41. In an ecosystem, animal which feed directly on plants are called

A. Secondary consumer B. Primary consumer C. Producer D. Predators E. None of the above

42. Movement and position of the head in man are detected by the

A. Cochea B. Malleus C. Utriculus D. Semicircular canals E. Outer ear

43. In the fish the sense organs which detect movement in the water are located within the

A. Gills B. Operculum C. Nostril D. Median fins E. Lateral line

44. The male toad differs from the female by having

A. Vocal sacs B. Shorter hind limbs C. Longer fore limbs D. Bulging eyes E. Nictating membrane

45. Which of these animal is NOT metamerically segemented?

A. Tape worm B. Earth worm C. Centipede D. Crayfish E. Shark

46. The glottis is the opening which leads to the

A. Oesophagus B. Larynx C. Nostril D. Pharynx E. Mouth

47. An organism X lives entirely on the waste products in another organism Y. In this association X is a

A. Symbiont B. Saprophyte C. Commensal D. Parasite E. Epiphyte

48. The one-seed fruit in which the pericap and seed coat have become fused together is known as

A. Achene B. Samara C. Legume D. Caryopsis E. Drupe

49. The digestive enzyme that coagulate protein in milk is

A. Ptyalin B. Pepsin C. Rennin D. Trysin E. Amylase

50. In mucor or rhizopus carbohydrate is absorbed in the form of

A. Starch B. Sucrose C. Glycogen D. Arabinose E. Glucose

DETAILED SOLUTIONS OF DAY 2 TYPE R FUTO 2013/2014 POST UTME SCREENING

PHYSICS

1. Given
$V_1 = 30dm^3$; $T_1 = 273k$; $P_1 = 760$ mmHg
$T_2 = 91^0c = (91 + 273) = 364k$, $P_2 = 380$ mmHg
$V_2 = ?$

Recall $\frac{V_1P_1}{T_1} = \frac{V_2P_2}{T_2} = \frac{30 \times 760}{273}$

$= \frac{v_2 \times 380}{364}$

$v_2 = \frac{30 \times 760 \times 364}{273 \times 380} = 80dm^3$ -------(D)

2. $V_1 = 28.8\ cm^3$; $T_1 = 15^0c = 288k$;
$T_2 = 0^0c = 273k$; $V_2 = ?$

$recall\ \frac{V_1}{T_1} = \frac{V_2}{T_2} = \frac{28.8}{288} = \frac{v_2}{273} = V_2 = \frac{28.8 \times 273}{288}$

$V_2 = 27.3\ cm^3$ ---------- (C)

3.

4. Given $v_B = 24.83cm3$; $c_B = 0.15m$
$v_A = 39.45\ cm$; $c_A = ?$ $n_A = 1$ $n_B = 1$

$NaOH + HCL \rightarrow NaCL + H_20 = 1$
$1 : 1$

using $\frac{C_AV_A}{C_BV_B} = \frac{n_A}{n_B} = \frac{c_A \times 39.45}{0.15 \times 24.83} = \frac{1}{1}$

$c_A = \frac{3.7245}{39.45} = 0.094M$-------(A)

5. Given $v_A = ?$; $c_A = 0.1M$; $v_B = 45cm^3$; $c_B = 0.2M$
As above ; $v_A = 27cm^3$----------(D)

6. $P^H = -\log_{10}[H^+] = 4.398 = -\log_{10}[H^+]$
$[H^+] = 10^{-4.398} = [H^+] = 10^{-5} \times 10^{0.602}$
$= 3.9994 \times 10^{-5} = 4.0 \times 10^{-5}$ ----------(A)

7. $11.0 \times 0.05 = 0.55dm^3$ ----------(C)

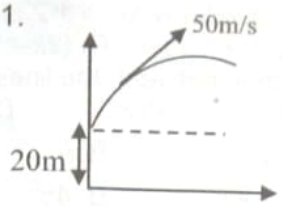
8. $v_1 = 2dm^3$; $t_1 = 300k$; $v_2 = 4dm^3$; $t_2 = ?$
recall
$\frac{v_1}{t_1} = \frac{v_2}{t_2} = \frac{2}{300} = \frac{4}{t_2} = t_2 = 600k$ ----------
----(D)

9. 3.75 ----------(C)

10. SP^3 hybridized ----------(B)

PHYSICS

11.



----------(B)

12. Time of flight T = $2\pi\sqrt{\frac{L}{g}}$

$2 = 2(3.142)\sqrt{\frac{l}{9.8}} = L = 0.99$

If L is doubled $T = 2(3,142)\sqrt{\frac{2(0.99)}{9.8}}$

$= 2.833$ -----(B)

13. 5N ----------(A)

14. Given
M= 60kg ; H= 22m ; P = 0.25kw= 250w
T=?

$P = \frac{work\ done}{time}$ = time $T = \frac{60 \times 22}{250}$

T = 5.285 ---------- (B)

15. Mass x temperature change = 3 x (20-10)
= 3x10 = 30^0C ..... (E)

16. 45^0C ----------(A)

17. 4V ----------(A)

18. $9.0x10^{-3}J$ ----------(C)

19. recall $L = \frac{3\lambda}{4}$

$\Rightarrow 33 = \frac{3\lambda}{4}$ $\therefore \lambda = \frac{4 \times 33}{3}$

$\lambda = 44\ cm$ --------(C)

20. 1^{st} 9 days → ½ remains
18 days → ¼
27 days → ⅛
36 days → $1/16$ remained
Fraction that has decayed = $\frac{1}{1} - \frac{1}{16}$
$= \frac{16-1}{16} = \frac{15}{16}$ ----------(D)

MATHEMATICS

21. ½ ---------- (D)

22. $y = 7x^4 + \cos x - 5$
$\frac{dy}{dx} 7x^4 + \cos x - 5$
$= 28x^3 - \sin x$ ----------(C)

23. $30\left[\frac{n!}{(n-5)!5!}\right] = \frac{n!}{(n-4)!}$

30 $\left[\frac{n\,x(n-1)x(n-2)x(n-3)x(n-4)x(n-5)!}{(n-5)!x\ 120}\right]$

$= \frac{n\,x\,(n-1)x(n-2)x(n-3)x(n-4)!}{(n-4)!}$

$= \frac{n(n-1)(n-2)(n-3)(n-4)}{4} = \frac{n(n-1)(n-2)(n-3)}{1}$

$= n - 4 = 4 \Rightarrow n = 4 + 4 = 8$ .....(E)

24. $3^{2x+3} - 3^{x+2} - 3^{x+1} + 1 = 0$

$3^{2x+3} - 3^{x+2} - 3^{x+1} + 3^0 = 0$

$(3^x)^2 x\ 3^3 - (3^x)\ x\ 3^2 - (3^x)\ x\ 3 + 3^0 = 0$

Let $M = 3^x$

$27M^2 - 9M - 3M + 1 = 0$; $27m^2 - 12M + 1 = 0$

$(27m^2 - 9M)(-3m + 1) = 0$; $9m\ (3m - 1) - 1(3m - 1) = 0$

$(9m - 1)$ or $(3m - 1) = 0$; $M = {}^1/_9$ 0r $M = {}^1/_3$

But $M = 3^x$ when $M = {}^1/_9 = 9^{-1}$

$3^x = 9^{-1}$; $3^x = 3^{-2}$; $x = -2$

When $M = \frac{1}{3} = 3^{-1}$

$3^x = 3^{-1}$

$x = -1$; $x = (-2, -1)$ ----------(A)

25. $= {}^{x+2}\overline{)2x^2 - 3x + 2}$ → quotient $2x - 7$

$2x^2 + 4x$

$-7x + 2$

$-7x - 14$

16 → Remainder

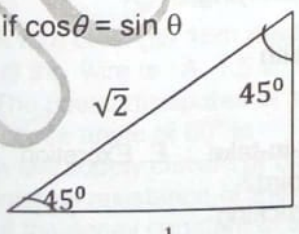
(2x-7,16)----------(C)

27. $\left(2^0 + 4^{-1/2}\right)^2$

$= \left(1 + \frac{1}{\sqrt{4}}\right)^2 = \left(1 + \frac{1}{2}\right)^2$

$= \left({}^3/_2\right)^2 = \frac{9}{4}$ ----------(C)

28. if $\cos\theta = \sin\theta$



$\sin 45^0 = \frac{1}{\sqrt{2}}$

$\cos 45^0 = \frac{1}{\sqrt{2}}$

Hence $\theta = 45^0$

..... (B)

29. $\frac{1}{6}$ ----------(A)

30. $\frac{dy}{dx}$ of $\frac{3+2x-x^2}{6}$

$= \frac{dy}{dx} = \frac{3}{6} + \frac{2x}{6} - \frac{x^2}{6}$

$= \frac{2}{6} - \frac{2x}{6} \rightarrow \frac{1}{3} - \frac{x}{3}$

$= \frac{1-x}{3} = \frac{1}{3}(1 - x)$ ----------(A)

USE OF ENGLISH LANGUAGE

31. have been working ..... D
32. an item ..... E
33. says they are ..... A
34. under ..... B
35. teaches ..... A
36 went..... B
37. academician..... C
38. went ..... B
39. one ..... B
40. will be ..... B

BIOLOGY

41. primary ..... B
42. semicircular ..... D
43. lateral line ..... E
44. vocal sacs ..... A
45. shark ..... E
46. larynx ..... B
47. commensal C
48. drupe ..... E
49. rennin C
50.

Examination success is a thing of the mind, preparation, courage confidence and ample reliance in HE that made you.

DAY 3 FUTO 2013/2014 POST UTME SCREENING TYPE V TIME: 1 HOUR

FOR CANDIDATES OF **ALL DEPARTMENTS IN SCHOOL OF SCIENCE, MANAGEMENT TECHNOLOGY, AGRICULTURE AND AGRICULTURAL TECHNOLOGY, ENVIRONMENTAL TECHNOLOGY AND HEALTH TECHNOLOGY.**

MATHEMATICS

1. If $52_n - 24_n = 25_n$ then n is =
   A. 4 B. 7 C. 11 D. 5 E. 2
2. The value of n that satisfies $\frac{8^{n+2} - 6(2^{n+1})^3}{2^n \times 4^{n+2}}$
   A. 1 B. $1/2$ C. $\frac{1}{4}$ D. 2 E.4
3. Find x if $(2.5)^{x-3} = (0.4)^{6+x}$
   A. 1.5 B. 2.5 C. – 1.5 D. – 2.5 E. 2
4. Solve the following equation $\sqrt{x+6} = 1 + \sqrt{x+1}$
   A. 3 B. 4 C. 5 D. 2 E. 1
5. The remainder when (x+3) divides $2x^3 - 11x^2 + 8x - 1$ is
   A. -871 B. -781 C. -187 D. -178 E. 0
6. If A is set of even numbers between 1 and 10 inclusive, find the power set of A, P(A).
   A. 5 B. 32 C. 16 D. 64 E. 128
7. If 3(2x) = 24 then x is
   A. 2 B. 4 C. 8 D. 3 E. 1
8. Simplify $\cos^2 x (\sec^2 x \tan^2 x)$ A. 2 B. 4 C. -1 D. 1 E. 5
9. What is the value of n if $5x^nP_3 = 24x^nC_4$
   A. 4 B. 6 C. 8 D. 2 E. None of the above
10. The remainder when x + 3x- 5x + 7x – x is divided by x-1 is
    A. 5 B. 0 C. 1 D. 3 E. 17

USE OF ENGLISH LANGUAGE

11. Three quarters of physics class ---------- dramatically.
    A. Improve B. Improves C. Are improving D. Is improving E. Have improve
12. The university has large collection of sporting ----------
    A. Equipment B. Equipments C. Costumes D. Aids E. Facility
13. There are --------- on the spelling and pronunciation at the end of the book.
    A. Appendixes B. Appendix C. Appendices D. Appendixes' E. Appendices'
14. A range of options ------- available to the political parties during the recent concluded elections.
    A. Were made B. Is made C. Are made D. Is make E. Was made
15. Either Ada or you ---------- to go. A. Was B. Are C. Has D. Is E. Had
16. A very popular ruler is at the ----------
    A. Helms of affair B. Helm of affair C. Realm of affair D. Helm of affairs E. Helms of affairs
17. I hardly ---------- down to sleep when I heard the gunshot.
    A. Lay B. Lied C. Lain D. Laid E. Lie
18. I have already ---------- it on the sitting room wall.
    A. Hanged B. Hunged C. Hang D. Hung E. Hanging
19. The visitor was very uncomfortable because of his ---------- nose.
    A. Runny B. Running C. Watery D. Flowing E. Runnying
20. The members of the other team agree-------- all the terms of the contract.
    A. By B. To C. On D. of E. With

BIOLOGY

21. The cilia in paramecium are used for
    A. Respirating B. Locomotion C. Protection D. Regulating food-in-take E. Excretion
22. Which of these is not associated with the movement of the toad, reptile or bird?
    A. Hopping B. Bopping C. Flapping D. Gliding E. Pecking
23. The region of cell division in a root is
    A. Root cap B. Endodermis C. Xylem D. Piliferous layer E. Meristem
24. Which of the following insects has an incomplete metamorphosis during life cycle?
    A. Grasshopper B. Bee C. Mosquito D. Housefly E. Butterfly
25. The deficiency of vitamin D leads to

A. Scurvy B. Pellagra C. Rickets D. Beriberi E. Polio

26. Exoskeleton is not found in the
A. Maggot B. Mosquito larva C. Earthworm D. Caterpillar E. Termite

27. How many nuclei are found in a pollen tube during fertilization
A. 2 B. 3 C. 5 D. 6 E. 7

28. A group of similar cells performing the same function is
A. An organ B. A system C. A tissue D. An organelle E. An enzyme

29. One disease not caused directly by bacteria is
A. Malaria B. Tuberculosis C. Pneumonia D. Tetanus E. Cholera

30. Which vertebra has a projection called odontoid process?
A. Atlas B. Thoraic C. Lumbar D. Axis E. Caudal

CHEMISTRY

31. How many grams of hydrogen gas will be liberated when 6g of magnesium ribbon dissolves in $500cm^3$ of 6M HCl? (Mg =24, H = 1, Cl = 35.5) A. 1.2g B. 0.7g C.0.5g D.0.3g E. 0.12g

32. The ratio of the number of molecules in 2g of hydrogen to that in 16g of oxygen is
A. 2:1 B. 1:1 C. 1:2 D. 1:4 E. 1:6

33. The minimum volume of oxygen required for the complete combustion of a mixture of $10cm^3$ of CO and $15cm^3$ of H_2 is A. $25.0\ cm^3$ B. $12.5cm^3$ C. $10.0cm^3$ D. $5.0cm^3$ E. $10.5cm^3$

34. An element X_1 forms a volatile hydride XH_3 with a vapour density of 17.0. The relative atomic mass of X is A. 34.0 B. 31.0 C. 20.0 D. 14.0 E. 30.0

35. The PH of a solution obtained by mixing $100cm^3$ of 0.1M HCl solution with $100cm^3$ of 0.2M solution of NaOH is A. 1.3 B. 7.0 C. 9.7 D. 12.7 E. 10.7

36. How many moles of limestone will be required to produce 5.6g of CaO?
A. 0.20mol B. 0.10mol C. 1.12mol D. 0.56mol E. 0.30mol

37. If $30cm^3$ of a gas at 50^0C is warmed to 80^0C at a fixed pressure, the fractional increase in volume is
A. 0.009 B. 0.093 C. 0.910 D. 1.090 E. 0.193

38. What is the volume of oxygen required to burn completely $45cm^3$ of methane at S.T.P?
A. $135.0cm^3$ B. $180.0cm^3$ C. $45.0cm^3$ D. $190.0cm^3$ E. $90.0cm^3$

39. What is the pH of 0.001 mol dm^{-3} solution of sodium hydroxide?
A.14 B. 13 C.12 D. 11 E. 10

40. The number of isomer that can be obtained from C_4H_{10} is
A. 3 B. 4 C. 1 D. 5 E. 2

PHYSICS

41. A body start from rest and moves with uniform acceleration of $6ms^{-2}$. What distance does it cover in the third second? A. 30m B. 27m C. 18m D. 15m E. 2m

42. An object is projected with a velocity of $80ms^{-1}$ at an angle of 30^0 to the horizontal. The maximum height reached is A. 20m B. 80m C. 160m D. 320m E. 240m

43. What is the frequency of vibration if the balance wheel of a wrist watch makes 90 revolution in 25s?
A. 3.60Hz B. 2.27Hz C. 0.04Hz D. 0.01Hz E. 2.60Hz

44. A beam of light is incident from air at an angle of 30^0. Find the angle of refraction if the refractive index of water is $^4/_3$ A. 0.15^0 B. 22.02^0 C. 41.81^0 D. 0.67^0 E. 0.38^0

45. A concave lens of focal length 20cm forms an image $^1/_2$ the size of the object. The object distance is A. 100cm B. $\frac{100}{9}$ C. $\frac{60}{7}$ D. 10cm E. 60cm

46. A wire of length 15m made of a material of resistivity $1.8 \times 10^{-6}\Omega$-m has a resistance of 0.27Ω. Area of the wire is A. $1.5 \times 10^{-4}m^2$ B. $1.0 \times 10^{-4}m^2$ C. $2.7 \times 10^{-5}m^2$ D. $7.3 \times 10^{-5}m^2$ E. $1.5 \times 10^{-5}m^2$

47. The power dissipated in an A.C circuit with an r.m.s. current of 5A, r.m.s. voltage of 10V and a phase angle of 60^0 is A. 25W B. 50W C. 120W D. 125W E. 2W

48. A cell supply current of 0.04A and 0.2A through a 4.0Ω and 10.0Ω resistors respectively. The internal resistance of the cell is A. 2.0Ω B. $1.0\ \Omega$ C. $2.5\ \Omega$ D.$1.5\ \Omega$ E. $0.5\ \Omega$

49. If the decay constant of a radioactive substance is $0.231s^{-1}$, the half is
A. 1.50s B. 0.33s C. 0.12s D. 3.00s E. 2.31s

50. What is the number of neutrons in the uranium isotope, $^{238}_{92}U$?
A. 92 B. 146 C. 238 D. 330 E. 119

DETAILED SOLUTIONS OF DAY 3 TYPE V FUTO 2013/2014 POST UTME SCREENING

MATHEMATICS

1. $52_n - 24_n = 25_n$

Assuming n is of base 7 then; $\begin{array}{r} 52 \\ -24 \\ \hline 25_7 \end{array}$

$\therefore$ n = 7 ---------- (B)

2. $\frac{8^{n+2}-6(2^{n+1})^2}{2^n x 4^{n+2}} = \frac{2^{3n+6}-6(2^{n+1})^3}{2^n \times 2^{2n+4}}$

$= \frac{2^{3n+6}-(6)2^{3n+3}}{2^n \times 2^{2n+4}} = \frac{2^{3n+6}-2^{3n+3}(6)}{2^{n+2n+4}}$

$= \frac{2^{3n+6}-2^{3n+3}(6)}{2^{3n+4}} = \frac{(2^n)^3 x 2^6 - (2^n)^3 x 2^3 x 6}{(2^n)^3 x 2^4}$

Let 2^n =M $\Rightarrow \frac{64M^3-48M^3}{16M^3} = \frac{16M^3}{16M^3}$ = 1-------- (A)

3. $(2.5)^{x-3} = (0.4)^{6+x}$

$= \left(\frac{5}{2}\right)^{x-3} = \left(\frac{2}{5}\right)^{6+x}$ = x = 1.5 ----------(C)

4. $\sqrt{x+6} = 1 + \sqrt{x+1}$

$\left(\sqrt{x+6}\right)^2 = \left(1+\sqrt{x+1}\right)^2$

$x + 6 = 1 + 2\sqrt{x+1} + x + 1$

$x + 6 = 2 + x + 2\sqrt{x+1}$

$2\sqrt{x+1} = 4$

$\sqrt{x+1} = 2$

$\left(\sqrt{x+1}\right)^2 = (2)^2$

$X + 1 = 4$

$X = 4 - 1 = 3$----------(A)

5. X+3 =0 ; X = - 3

$2(-3)^3 - 11(-3)^2 + 8(-3) - 1$

- 54 – 99- 24 -1 = -178 ---------- (D)

6. A = 2,4,6,8,10

$=2^5 = 32$ ---------- (B)

7. $3(2^x) = 24 \Rightarrow 3(2^x) = 3(8) \Rightarrow 3(2^x)$

$=3(2^3)$

$=2^x = 2^3 \Rightarrow x=3$---------- (D)

8. $cos^2x\ (sec^2x\ tan^2x)$

9. $5\left[\frac{n!}{(n-3)!}\right] = 24\left[\frac{n!}{(n-4)!4!}\right]$ =

$5\left[\frac{n\ x\ (n-1)\times(n-2)\times(n-3)!}{(n-3)!}\right]$ =

$24\left[\frac{n\times(n-1)(n-2)(n-3)(n-4)!}{(n-4)!\times 24}\right]$

$5(n(n-1)(n-2)) = n(n-1)(n-2)(n-3)$

$5 = n - 3 \Rightarrow n = 5 + 3 = 8$ ----------(C)

10. $x - 1 = 0 \Rightarrow x - 1$

$x + 3x - 5x + 7x - 5 \Rightarrow 1 + 3(1) - 5(1) + 7(1) - 1$

$1 + 3 - 5 + 7 - 1 = 6$ ..... (A)

USE OF ENGLISH LANGUAGE

11. Are improving C
12. Equipment ..... A
13. Appendixes ..... A
14. Were made ..... A
15. Are ..... B
16. Helm of affairs ..... D
17. Lain C
18. Hung..... D
19. runny ..... A
20. on C

BIOLOGY

21. locomotion ..... B
22. bopping ..... B
23. xylem C
24. house- fly..... D
25. rickets C
26. earthworm C
27 3..... B
28. a tissue C
29. pneumonia C
30. caudal..... E

CHEMISTRY

32. $\frac{2}{16}$ = 1:8 ----------(E)

34. R.M.M = 2 x V.D

R.M.M of xH_3 = 2 x 17 = 34

hence x +3(1) =34; X= 34-3

R.A.M of x = 31---------- (B)

36. $CaCO_3 \longrightarrow CaO + CO_2$
1mole $\longrightarrow$ 56g
X mole $\longrightarrow$ 5.6g
$X = \frac{5.6}{56} = 0.1g$ ---------- (B)

37. $V_1 = 30\ cm^3$
$T_1 = 50^0C = 323k$
$T_2 = 80^0C = 353k$
$V_2 = x$
Recall $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
$\frac{30}{323} = \frac{x}{353}$; $x = 32.79cm^3$
∴ fractional increase of $v = \frac{30}{32.79}$
$= 0.91$ -----(C)

38. $90.0\ cm^3$ ---------- (E)

40. 3. ---------- (A)

PHYSICS

41. Given
U = 0
$a = 6ms^{-2}$
s = ?
t = 3s
applying equation of motion
$S = ut + \frac{1}{2}at^2$
$S = (0 \times 3) + \frac{1}{2} \times 6 \times (3^2)$
$s = 3 \times 9 = 27m$ ----------(B)

42. $V = 80m5^{-1}$
$\theta = 30^0$,
Hmax = ?
$Hmax = \frac{U^2 sin^2}{2g} = \frac{(80)^2 sin^2 30^0}{2 \times 9.8}$
$= \frac{1600}{19.6} = 81.63m$ ..... B

44. 22.02^0 ---------- (B)

45. 60 cm ---------- (E)

46. Given
$\rho = 1.8x\ 10^{-6}\Omega - m$
R = 0.27Ω ; A = ? ; L=15m
$\rho = \frac{R \times A}{L}$; $L = \frac{R \times A}{\rho}$
$A = \frac{L \times \rho}{R}$; $A = \frac{15 \times 1.8 \times 10^{-6}}{0.27} = \frac{2.7 \times 10^{-5}}{0.27}$
$= 1 \times 10^{-4} m^2$ .....(B)

47. 25W ---------- (A)

48. $I_1 = 0.4A$ through $4.0\Omega(R_1)$
$I_2 = 0.2A$ through $10.0\Omega(R_2)$
Using $I_1 (R_1 + r_1) = I_2 (R_2 + r)$
$0.4(4+r) = 0.2(10+r)$
$1.6 + 0.4r = 2 + 0.2r$
$0.4r - 0.2r = 2 - 1.6$
$r = {}^{0.4}/_{0.2} = 2\Omega$---------- (A)

49. If $K = 0.2315^{-1}$
From $t\frac{1}{2} = \frac{0.693}{K} = t\frac{1}{2} \frac{0.693}{0.231} = 3s$ --- (D)

50. No. of protrons = No. of electron = 92
Mass no = no of neutrons + no protrons
238 = no of neutrons + 92
No of neutrons = 238 - 92 =146----- (B)

YOU CAN! IF ONLY YOUR MIND SAYS YES!!!

The greatest discovery of my generation is that human beings can alter their lives by altering their attitude of mind (William James). This goes a long way to show that true success lies in the conditioning of the mind, it does not really matter if you have had poor performance in exams before, neither does it matter what your friends say about how tough a particular examination is, what really matters is your strong conviction that you will excel.

There are four important secrets of passing examinations with particular reference to the post – UTME screening examination, they include:

- Adequate preparation
- Adopting good study habits
- Adopting the right approach to answering questions
- Overcoming the fear of failing exams.

HELPFUL MEMORY TIPS

a. Make a conscious effort to remember what is learnt, if not 70% of data will be lost in 24 hrs.
b. Try to pictualize the information, because real information is more remembered than abstract ones.
c. Develop mnemonics
d. Create a strong association , connection and hooks
e. Decide to remember
f. Take breaks often, as much as 30 minutes after learning for 90 minutes.
g. Sleep! Sleep!! Sleep!!!
This is a tool you can use in actually recording and filling away things you have learned.

DAY 1 FUTO 2012/2013 POST UTME SCREENING TYPE O
FOR CANDIDATES OF ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

Chemistry

1. 120 cm^3 of hydrogen were sparked with 60cm^3 of oxygen at 110°C. What was the volume of steam produced? The equation for the reaction is $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(g)}$
   A. 30cm B. 60cm C. 90cm D. 120cm E. 150cm.
2. Catalytic hydrogenation of oils results in the production of?
   A. soaps B. detergents C. alkanes D. margarine E. butter.
3. Which of the following compounds will undergo additional reactions?
   A Ethyne B. Butane C. Petane D. Ethanol E. tetrachloromethane.
4. The products of the electrolysis of dilute sodium chloride solution with platinum electrodes are.
   A. hydrogen and oxygen B. oxygen and chlorine C. chlorine and water
   D. sodium amalgam and chlorine E. sodium hydroxide and water.
5. When starch undergoes complet enzyme-catalysed hydrolysis, the resulting product is.
   A. glucose B. maltose C. sucrose D. fructose E. cellulose.
6. Compounds that have the same molecular formular but different structures are said to be.
   A. allotropic B. polymorphic C. polymeric D. isomeric E. isotopic.
7. The maximum number of electrons that can be accommodated in the shell having the principal quantum number 3 is.
   A. 3 B.9 C. 10 D. 18 E. 32.
8. The following acids are non basic except A. methanoic acid B. dioxinotrate III acid
   C. ethanedioic D. oxochlorate (I) acid E. hydrobromic acid.
9. What is the quantity of electricity produced when a current of 0.5A is passed for 5hours 45mins? (IF = 96500C) A. 0.11F B. 0.12F C. 0.22F D. 1.1F E. 2.2F
10. Which of the following pH values is likely to be that of a slightly alkaline system?
    A. 2 B. 5 C. 7 D. 8 E. 13.

Physics

11. Which of the following is not a consequence of a force field?
    A. weight B. surface tension C. gravitational pull D magnetic force E. electric force.
12. Which of the following is used to determine the relative density of the acid in a car battery?
    A. Hypsometer B. Hygrometer C. Manometer D. Hydrometer E. Nanometer.
13. The motion of the prongs of sounding tuning fork is?
    A. random B. translational C. Rotational D. vibratory E. vibratory and rotational.
14. A simple microscope forms an image twice the size of the object. If the focal length of the lens of the microscope is 29cm, how far is the object from the lens?
    A. 10m B. 20m C. 30m D. 40m E. 60m.
15. An avocado fruit drops from the top of a tree 45m tall. How long does it take to reach the ground?
    A. 3.0s B. 4.5s C. 6.0s D. 8.6s E. 9.0s.
16. Which of the following is a scalar quantity?
    A. momentum B. acceleration C. displacement D. distance E. Force.
17. A ball bearing is gently released from rest and allowed to fall through a viscous fluid. Which of the following statements about the motion is correct?
    A. Its acceleration decreases before terminal velocity is attained
    B. When terminal velocity is attained the acceleration of the fluid becomes zero
    C. Its velocity Increases before terminal velocity is attained
    D. There is no resultant force on the ball before it attains terminal velocity,
18. When the vapour of a substance is in equilibrium with its own liquid, it is said to be
    A. gaseous B. unsaturated C. saturated D. diffused E. liquefied
19. A man standing between two parallel mirrors in a barbers shop will see the following number of his own image
    A. Eight B. Two C. Four D. One E. Infinite
20. If the wave length of a wave travelling with a velocity of 360ms^{-1} is 60cm, the period of the wave is
    A. 6s B. 3.6s C. 0.17s D. 0.61s E.3s
21. A micrometre is defined as one millioneth of a millimeter. A length of 12,000 micrometers may be represented as? A. 0.00012M B. 0.0000012M C. 0.000012M D. 0.00000012M E. 0.000 000012M.

Mathematics

22. Factorise $3x^2 + 4x^2 - 13x + 6$ completely, given that x-1 is a factor.
    A. (x-1) (x-3)(x+2) B. (x-1)(x+3)(x-2) C.(x-1)x+3(3x-2) D. (x-1)x+3(3x-2) E. (x- 1)(x 3)(x + 2).
23. If the price of oranges was raised by 1/2k per orange, the number of oranges a customer can buy for N2.40 will be less by 16. What is the price of an orange? A. 21/2k B. 31/2k C. 51/2k D. 20k E. 25k.
24. Find all real numbers x which satisfies the inequality 1/3(x+1)-1>1/5(x+4).
    A. x<11 B. x<-1 C. x>6 D. x>11 E. x>-6.

25. 7 pupils of average age 12 years leave a class of 25 pupils' average age 14 years. If 6 new pupils of average age 11 years join the class, what is the average age of the pupils now in the class?
A. 13 years B. 12 years 71/2months C. 13 years 5 months D. 13 years 10 months
E.13 years 71/2 months

26. Given a regular hexagon, calculate each interior angle of the hexagon.
A. 60° B. 120° C. 45° D. 135° E. 140°

27. Without using tables solve the equation $8x^{-2} = 2/5$.
A. 4 B. 6 C. 8 D. 10 E.12.

28. A student measures a piece of rope and found that it was 1.26m long. If the actual length of the rope is 1.25m, what was the percentage error in the measurement?
A. 0.40% B. 0.01% C. 0.25% D. 0.89% E. 0.80%.

29. Express the product of 0.21 and 0.34 in standard form.
A. 7.14×10^{-3} B. 7.14×10^{-1} C. 7.14×10^{-2} D. 7.14×10^{-4} E. 7.14×10^{-5}

30. If 5,8,6 and 2 occur with frequencies 3,2,4 and 1 respectively, find the product of the modal and median number. A. 36 B. 48 C. 30 D.40 E. none of the options.

USE OF ENGLISH

31. Without — words he accused him directly of treachery.
A. amending B. modifying C. mixing D. mincing E. Minimizing.

32. They tried to cash in—— the peoples ignorance.
A. under B. on C. against d. with E. at.

33. Always remember to— the lights before leaving the room
A put on B. put off C. switch off D. blow out E. remove.

34. I am disappointed _____the ways, you conducted yourself at the party.
A. by B. for C. due D. in . E. at.

35. The proprietors should be blamed for such a deplorable condition in the nursery schools——-
A. isn't it B. shouldn't they C. should they D. is it E. wouldn't they.

36. Do you mind——another minute or two?
A. to wait B. wait C. waiting D. being waited E. wait

37. It had been raining before the match started——
A. isn't it B. hasn't it C. hadn't it D. Wasn't it E. haven't it.

38. Mary goes to school ——bus.
A. in B. on C. with D. of E. by.

39. The plane overshot the ——— in a n accident.
A. road B. hanger C. runway D. tarmac E. railway.

40. Journalists always collect and publish———
A. Information B. informations C. an information D. much information E. every information.

Biology

41. A plant which grows on another plant without apparent harm to the host plant is called
A. a parasite B. an epiphyte C. a saprophyte D. a predator E. a hermaphrodite.

42. Which of these types of skeleton is most appropriate to the cockroach?
A. Hydrostatic skeleton B. Exoskeleton C. Endoskeleton D. Cartilaginous skeleton
E. Bony skeleton.

43. Which of these is not true of the insect? The possession of
A. two pairs of antennae B. jointed appendages C. exoskeleton D. three pairs of legs
E. segmented body.

44. All living things
A. photosynthesize B. respire C. move D. transpire E. feed.

45. A Secchi disc is used in the determination of
A. rainfall B. tides C. waves D. turbidity E. current velocity

46. Which of the following is not an excretory product?
A. Urine B. Sweat C. Feaces D. Salts E. Carbon dioxide.

47. Which of the following organs produce bile?
A. Gall bladder B. Pancreas C. Spleen D. Liver E. Stomach.

48. Which of the following food substances is digested in the stomach?
A. carbohydrates B. Fats and oil C. Fats and Protein D. Proteins E. Carbohydrates and Fats.

49. For pollination and fruit formation, the essential part (s) of the flower should be the
A. corolla B ovary C. pistil (gynoecium) D. ovules E. receptacle.

50. Which part of the human brain is concerned with reflexes controlling the rate of heart beat and breathing?
A. medulla B. cerebrum C. cerebellum D. eal body E. Olfactory lobe.

SOLUTIONS TO DAY 1 FUTO POST UTME 2012/2013 TYPE O

Chemistry

1. $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(g)}$
   By comparing the number of mole, if $120cm^3$ of $H_{2(g)}$ was sparked, $120cm^3$ of steam will be produced. ..... A

2. C

3. A

4. A

5. A (partial hydrolysis gives mattose, complete hydrolysis gives glucose)

6. A

7. D

8.

9. $\Phi = It$; $I = 0.5A$; $t = 5$ hours 45mins
   $= (5 \times 60 \times 60) + (45 \times 60)$
   $= 20{,}700$ seconds
   $\Phi = It = 0.5 \times 20{,}700 = 10{,}350$ C
   Since IF = 96500 C
   $\Rightarrow 10{,}350 \text{ C} = \frac{10{,}350}{96{,}500} = 0.11F$

9. A

10. D

PHYSICS

11. B

12. D

13. D

14. magnification, $m = {}^{v}/_{u} = 2 \Rightarrow v = 2u, f = 29cm$
    U = unknown
    Lens formula : $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
    $\frac{1}{29} = \frac{1}{u} + \frac{1}{2u}$; $\frac{1}{29} = \frac{3}{2u}$
    $u = \frac{29 \times 3}{2}$; u = 43.5cm
    No answer. However, the closest is 40cm.

15. $S = v_0t + \frac{1}{2}gt^2$; $45 = 0 \times t + \frac{1}{2} \times 10 \times t^2$
    $45 \times 2 = 10t^2$; $\frac{90}{10} = t^2$
    $\sqrt{9} = t$; $3 = t$ A

16 D

17 A

18 C

19 E $\left(\frac{360}{\theta} - 1\right)$ is the formula to use

20. $T = {}^{\lambda}/_{v} = \frac{{}^{60}/_{100}}{360} = \frac{60}{100 \times 360} = 0.0016$sec
    (No answer but a close resemblance is D)

21. C

Mathematics

22. Factorizing $3x^3 + 4x^2 - 13x + 6$ given x-1 as a factor

$$
\begin{array}{r|l}
 & 3x^2 + 7x - 6 \\
\hline
x-1 & 3x^3 + 4x^2 - 13x + 6 \\
 & 3x^3 - 3x^2 \\
\hline
 & 7x^2 - 13x \\
 & 7x^2 - 7x \\
\hline
 & -6x + 6 \\
 & -6x + 6 \\
\hline
 & 0
\end{array}
$$

And $(3x^2 + 7x - 6) = 3x^2 + 9x - 2x - 6$
$3x(x+3) - 2(x+3)$
$(3x - 2)(x+3)$
The factors are
$(x-1), (3x-2), (x+3)$

22. D and C are (the same) the answers

23.

24. $\frac{1}{3(x+1)-1} > \frac{1}{5(x+4)}$; $\frac{1}{3x+2} > \frac{1}{5x+20}$
    Multiplying through by the LCM of
    $(3x + 2)(5x + 20)$; $5x + 20 > 3x + 2$
    $2x + 18 > 0$; $x > -9$
    No answer in the options.

25. let sum of ages of 7 people be
    $\sum P_7 = P_7(left)$
    Sum of ages of 25 people be $\sum P_{25} = P_{25}$
    Sum of ages of 6 people be

$\sum P_6 = P_6$ (joined)

$\frac{P_7}{7} = 12 \Rightarrow P_7 = 7 \times 12 = 84$

$\frac{P_{25}}{25} = 14 \Rightarrow P_{25} = 25 \times 14 = 350$

$\frac{P_6}{6} = 11 \Rightarrow P_6 = 6 \times 11 = 66$

New average $= \frac{350-84+60}{25-7+6} = \frac{332}{24}$

$13\,{}^{5}/_{6}$ yrs + $({}^{5}/_{6} \times 12)$ months

13yrs, 10 months - D

26. Regular Hexagon, $\theta = 180(n-2)$

$= 180(6-2) = 180 \times 4$

$= 720^0$

Since, it's a regular polygon (hexagon), all the interior angles are equal; Each interior angle $= \frac{720}{6} = 120^0$

26. B

27. $8x^{-2} = \frac{2}{5}$; $x^{-2} = \frac{2}{5} \times \frac{1}{8}$; $\frac{1}{x^2} = \frac{1}{20}$

$x^2 = 20$; $x = \sqrt{4 \times 5}$; $x = \sqrt[2]{5}$ A

28. Percetage error $= \frac{Error}{Acutal\ lengt\square} \times \frac{100}{1}$

$= \frac{1.26-1.25}{1.25} \times \frac{100}{1}$; $\frac{0.01}{1.25} \times \frac{100}{1}$

$= 0.80\%$ E

29. $0.21 \times 0.34 = 0.0714$

To standard form 7.14×10^{-2} C

30. Mode = 6 ; Arranging in order of magnitude 2,5,5,5,6,6,6,6,8,8

Median $= \frac{6+6}{2} = 6$

Product of mode and median

$= 6 \times 6 = 36$ A

USE OF ENGLISH

31. D

32. B

33. B

34. E

35. B

36. C

37. C

38. E

39. C

40. A

Biology

41. B

42. B

43.

44. E

45. D

46. C

47. D

48. A

49. C

50

Do you doubt this?

A mute boy told a deaf man that a blind man saw a cripple girl running to kick a man who has no hands but was carrying the baby of a barren woman.

If you do, then you must not doubt this below

i. Russian journalist Solomon Veniaminovich sheressheveskii was able to perform total recall of exactly what happened 15 years earlier.

ii. Mahmend Ali Halici of Turkey could recite 6500 verses of Koran

iii. Maori chief Kanmatare recounted in three days a thousand year history of his tribe.

iv. Julius Caesar could dictate seven different letters to his secretaries at a time without losing the thread of what he what he was saying in each of them.

v. Famous poet, blind john Milton composed forty glorious lines at a time in his poem "paradise lost"

The problem with you is not that you do not have what you learned in your brain.. but the problem is in accessing it when needed.

Learn more about memory enhancement today!!!

Dream big, every human being can afford to dream dreams. Those who dream by the night wake up to find out that it was all but vanity. But those who dream by the day with their eyes open turn the world.

They are uncommon achievers.

Men and women are limited not by the colour of their skin, nor by the size of their body, but by the size of their dreams.

Dream big, translate your dreams to reality and you will be forever remembered as men who strove with gods.

FUTO 2012/2013 POST UTME SCREENING TYPE S

DAY 2 : MATERIAL AND METALLURGICAL, CIVIL, POLYMER AND TEXTILE, PETROLEUM, CHEMICAL, MECHANICAL AND AGRICULTURAL ENGINEERING DEPARTMENTS

BIOLOGY

1. Which of the following hormones is produced during fright or when agitated.
A. insulin B. adrenalin C. thyroxine D. pitiutrin.
2. Which of the following animals is cold blooded?
A. cat B. lizard C. whale D. bird E. dog
3. Spirogyra reproduces vegetatively by
A. spore production B. fragmentation C. multiple fission D. binary fission E. division
4. All of the following are digestive enzymes except
A. bile B. lipase C. Maltase D. pepsin E. ptyalin
5. If a 26 year old man married a one eyed woman and they had four children how many of them would be blind like their father?
A. all B. 3 C. 2 D.1 E. None
6. A tapewonn has no alimentary canal because
A. It is an antotropic B. It does not feed C. It has no enzymes
D. its body absorbs digested food E. it is long
7. Where is energy produced in the cell?
A. Nucleus B. Nucleolus C. Lysosomee D. Mitochondria
8. Which of the following structure is not found in a female agama lizard?
A. Pre-anal pads B. Eardrums C. Nuchal crest D. Gular fold E. chloroplast
9. Which of the following disease is NOT caused by a virus
A. rinderpest B. maize rust C. Newcastle disease D. swine fever E. nasal scale
10. Plants which can survive in places where the water supply is limited are
A. bryophytes B. mesophyte C. xerophytes D. hyrophytes E. pteridophytes

Mathematics

11. Simplify: Log6 + log2 – log12
A. -4 B. -1 C. 0 D. 8 E.10
12. The Interior angles of a pentagon are $(2^x + 5)°$, $(x+20)°$, $x°$, $(3x-20)$ and $(x + 15)$ Find the value of x.
A. 80° B. 70° C. 65° D. 40° E. 30°
13. A train travels 60Km in M minutes. If its average speed is 400Km per hour, find the value of M.
A. 15 B. 12 C. 10 D. 9 E. 7
14. A baker used 40% of a 50Kg bag of flour. If 1/8 of the amount used was for cake, how many kilograms of flour was used for cake?
A 2 1/2 B. 6 1/4 C. 15 5/8 D. 17 1/2 E. 19 1/3.
15. Find the average of the first four prime numbers greater than 10.
A 20 B. 19 C. 17 D. 15 E. 13
16. Find the mean deviation of 6, 7, and 8,9,10.
A. 1.2 B. 1.5 C. 2 D. 8 E. 10
17. The variance of a given distribution is 25. What is the standard deviation?
A. 125 B. 75 C. 25 D. 5 E. 3
18. Express 7/19 as a percentage, correct to 1 decimal place.
A. 2.7% B. 3.7% C. 27.1% D. 36.8% E. 42.2%.
19. Given that $\log_4 x = -3$, find x.
A. 1/81. B. 1/64 C. 64 D. 81 E. 102
20. A chord of a circle radius 26cm is 10cm from the center of circle. Calculate the length of the chord
A. 16cm B. 27.86cm C. 32cm D. 40cm E. 48cm

Physics

21. Which of the following types of waves cannot travel through a vacuum?
A. sound wave B. light waves C. infra- red waves D. X-radiation E. radio waves
22. The temperature at which the water vapour in the air saturates the air and begins to condense is known as
A. boiling point B. melting point C. triple point D. dew point E. critical temperature
23. The motion of the moving skin of a talking drum can rightly be described as
A. translational B. random C rotational D. oscillatory E. transitory
24. What is the relative permittivity of a capacitor if its capacitance with a medium as dielectric is 16 farads, and its capacitance with vacuum as dielectric is 2 farads?
A. — B. -1/2 C. 2 D. 6 E. 8.
25. The activity of a radioactive substance depends on
A. temperature and purity B. Temperature and age C. Age, purity and temperature D. purity and age E. None of the above.
26. The principle of the transmissibility of pressure in fluids at rest in all directions is known as
A. Archimedes Principle B. Floatation Principle C. Newton's Law D. Pascal's Law E. Boyle's law.
27. Change of state is accompanied by change of

A. temperature B. volume C. heat content D. temperature and volume
E. volume and heat content.

28. The lack of power of accommodation which is mainly due to the hardening of the eye is called
A. Myopia B. hypermetropia C. presbyopia D. eye ring E. astigmatism.

29. The hatch door of a submarine has an area of $0.5m^2$. The specific gravity of sea water Is 1.03. (Assume that $g=10ms^{-1}$, and neglect the atmospheric pressure). The force exerted by sea water on the hatch door at a depth of 200m is A. 1.03×10^5 N B. 1.03×10^3 N C. 1.06×10^5N D. 2.06×10^6N E. 1.03×10^4 Nm^{-2}

30. The point beyond which a stretching spring does not return to its original length is called
A. breaking point B. elastic limit C. spring constant D. elastic point E. release point.

Chemistry

31. Which of the following solids has a network structure?
A. Diamond B. Iodine C. Sulphur D. Graphlte E. Butter.

32. The following gases decolourize bromine water except.
A. C_2H_6 B. C_2H_4 C. C_2H_2 D. C_3H_4 E. C_4H_6

33. The alloy used for metal work and plumbing contains.
A. lead and tin B. iron and carbon C. copper and tin D. aluminum and copper
E. aluminum and iron.

34. The components of universal indicator solution can best be separated by.
A. chromatography B. filtration C. evapouration D. fractional distillation E. transpiration.

35. The oxidation numbers of phosphorous in PO_4^{3-} is
A. +1 B. +2 C. +3 D. +5 E. +7.

36. Water can be obtained as the only product during
A. combustion of hydrocarbons B. neutralization of an acid by a base C. combustion of hydrogen D. electrolysis of brine E. boiling water.

37. The oxidation of ammonia in excess air produces
A. N_2O_2 B. N_2O C. NO_2 D. N_2O_4 E. NO

38. The gasification of coke is used for the manufacture of
A. producer gas B. natural gas C. synthetic gas D. Industrial gas E. artificial gas.

39. The solubility curve shows the variation of solute concentration with
A. volume B. temperature C. vapour D. pressure E. weight.

40. The density of a certain gas is $1.98gdm^{-3}$ at S.T.P. What is the molecular mass of the gas? (molar volume of a gas at S.T.P = $22.4dm^3$) A. 44.0g B. 54.0g C. 26.0g D. 31.0g E. 39.0_g

Use of English

41. Ifeyinwa found that thieves had entered her house in her absence. She went to the police to report the———
A. breakout B. breakup C. break in D. breakthrough E. breakin.

42. Gone are the days when he ——— enjoy patronage.
A. would B. will C. could D. used to E. can.

43. All ——— well with Peter. A. are not B. have not been C. were not D. is not E. aren't.

44. The villagers looked——their leader for good examples.
A. up to B. on to C. up at D. forward to E. into.

45. Emeka failed because the examination was —difficult for him.
A. so B. very C. highly D. too E. much.

46. The dancers were all in ----- before their departure.
A. good spirits B. good spirit C. high spirit. D. higt spirits E. highspirit.

47. The suspect defrauded his ——victim of large sums of money.
A. unsuspected B. unsuspecting C. unexpected D. unexpecting E. suspecting.

48. The judge acquitted the accused ---------- the eight counts.
A. of B. in C. from D. Upon E. on.

49. My uncle is one of the ——— of society.
A. Elitists B. elites C. elite D. elitist.

50. ------All probability, the train will arrive today.
A. In B. Under C. For D. By E. Upon.

SOLUTIONS TO DAY 2 FUTO 2012/2013 POST UTME SCREENING TYPE S

Biology

1. B 2. B 3. B
4. A 5. E 6. D
7. D 8. D 9. B 10. C

Mathematics

11. Simplify: $\log 6 + \log 2 - \log 12$; Since $\log B = \log AB$

$\log A - \log B = \log {}^{A}/_{B}$ Therefore

$\log 6 + \log 2 - \log 12 =$

$\text{Log } \frac{6 \times 12}{12} = \log 1$ To base say, 6 ;

$X = \log_b^1 \Rightarrow b^x = 1 \Rightarrow b^x = b^0 \Rightarrow x = 0$ *Ans* Or Simply

$\log 6 + \log 2 - \log 12 =$

$\log(6 \times 2) - \log 12 =$

$\log 12 - \log 12 = 0$ (As before) C

12. Sum of angles in a pentagon = 540^0; $(2x + 5) + (x + 20) + x + (3x - 20) + (x + 15) = 540$; $8x + 20 = 540$; $8x = 520$; $x = \frac{520}{8} = 65^0$ C

13. $x = 60$km; $t = $ Minutes $= \frac{1}{60}$ M hrs; $v = 400$km/h But from kinematics: (uniform rectilinear motion) $x = vt$

$60 = 400 \times \frac{1}{60}M$; $M = \frac{60 \times 60}{400} = 9$ D

14 $40\% \Rightarrow \frac{40}{100}$. 40% of 50kg

$\Rightarrow \frac{40}{100} \times 50 = 20$kg

$\frac{1}{8}$ of 20kg was used for cake, ie

$\frac{1}{8} \times 20\text{kg} = 2\frac{1}{2}$ kg A

15. The first 4 prime numbers greater 10 are: 11, 13, 17, 19

Average $= \frac{11+13+17+19}{4} = 15$ D

16. Mean deviation of 6, 7, 8, 9, 10

Mean, $m = \frac{\Sigma fx}{\Sigma fx} = \frac{\Sigma fx}{n}$

Mean deviation, $\overline{X}_D = \frac{\Sigma_i |x_i - m|}{n}$

$m = \frac{6+7+8+9+10}{5} = 8$

$\overline{x_D} = \frac{|6-8|+|7-8|+|8-8|+|9-8|+|10-8|}{5}$

$\overline{x_D} = \frac{6}{5} = 1.2$ A

17. Given variance, $v = 25$

Stand deviation, $D = \sqrt{\text{variance}}$

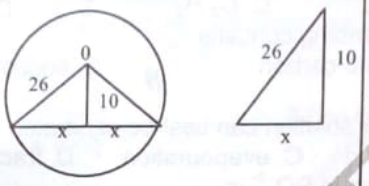
$D = \sqrt{25}$; $D = 5$ D

18. $\frac{7}{19}$ as a percentage to 1d.p

$\frac{7}{19} \times \frac{100}{1} = 36.8\%$ D

19. $\log_4 x = -3 \Rightarrow x = 4^{-3} = \frac{1}{4^3} = \frac{1}{64}$ B

20.



$26^2 = 10^2 + x^2$ $676 - 100 = x^2$

$\sqrt{576} = x$; $23.81 = x$

Hence, length of Chord $= 2x$

$= 2 \times 23.81 = 47.62$

≈ 48 E

PHYSICS

21. A

22. D

23. D

24. $C_1 = \frac{\varepsilon_0 A}{d}$ (in vacuum);

$C_2 = \frac{\varepsilon_r \varepsilon_0 A}{d}$ (Dielectric)

$\frac{c_1}{\varepsilon_0} = \frac{A}{d} = a =$ constant. hence

$\frac{C_1}{\varepsilon_0} = \frac{c_2}{\varepsilon_r \varepsilon_0}$; $\varepsilon_r = \frac{c_1}{\varepsilon_0} = \frac{c_2}{c_1}$

$= \frac{16}{2} = 8$

25. E

26. D

27. C

28. C.

29. Pressure, $P = {}^{F}/_{A}$

$\Rightarrow F = AP = A.h\rho g$

Bute =

specific gravity x density of water

$= 1.03 \times 1.0\text{kg/m}^3 = 1.03\text{kg/m}^3$

Hence, force,

$F = 0.5 \times 200 \times 1.03 \times 10$

$F = 1.03 \times 10^4 \text{N/m}^2$ .... E

Chemistry

30. E
31. A
32. A
33. A
34. A
35. To obtain the oxidation number of phosphorus in PO_4^{3-} The oxidation state of oxygen is -2

Let the oxidation number of phosphorus be x

$x - 8 = -3$; $x = -3 + 8$; $x = +5$

Hence, the oxidation number of P in PO_4^{3-} is +5 D

36. C
37. C
38. A
39. B
40.

Use of English

41. C
42. A
43. D
44. A
45. D
46.
47. B
48.
49. B
50. A

DAY 1 FUTO 2011/2012 POST UTME SCREENING TYPE B

FOR CANDIDATES OF: ELECTRICAL AND ELECTRONICS ENGINEERING (EEE) PETROLEUM ENGINEERING (PET) MATERIAL AND METTALURIGICAL (MME) AGRICULTURAL ENGINEERING

Answer all questions: shade the answer sheet as appropriate with HB pencil only. Time allowed: 35minutes

Chemistry

1. A mixture contains $20cm^3$ of hydrogen, $35cm^3$ of oxygen, $15cm^3$ of carbon dioxide and $10cm^3$ of nitrogen at S.T.P which of the following gives the mole fraction of hydrogen in this mixture?
   (a) 0.02 (b) 0.16 (c) 0.20 (d) 0.25 (e) 20
2. 0.07g of a hydride of carbon occupies 56 at S.T.P when vapourised and contains 14.29% by mass of hydrogen. The formula of the hydrocarbon is (a) CH_4 (b) C_2H_2 (c) C_2H_4 (d) C_2H_6 (e) C_3H_8(C=12,H=1)
3. The pressure on $100cm^2$ of oxygen gas at 35^0C is 750mm of Hg. What would be the volume of the gas if the pressure is increased to 1000mm of Hg without changing the temperature?
   (a) $133.3cm^3$ (b) $85cm^3$ (c) $75cm^3$ (d) $65cm^3$ (e) $58cm^3$
4. Which of the following bonds exist in crystalline ammonium chloride (NH_4CI)?
   (a) ionic and covalent (b) ionic and co-ordinate (c) ionic, covalent and co-ordinate
   (d) covalent, co-ordinate and metallic (d) ionic, covalent and metallic
5. Which of the following is neutralization reaction? Addition of
   (a) nitric acid to hydrochloric acid (b) nitric acid to sulphuric acid (c)acid to distilled water
   (d) nitric acid to sodium hydroxide (e) sodium chloride to distilled water.
6. In the preparation of carbon monoxide by heating ethanedoic acid with concentrated sulphuric acid, the conc. Sulphuric acid acts as
   (a) oxidizing agent (b) reducing agent (c) dehydrating agent (d) reaction medium (e) catalyst
7. How many grammes of methyl acetylene (propane) $CH_3 - C = CH$ will be completely discharge the colour of 8g of bromine? (Br=80, C = 12, H=1) (a) 0.5 (b) 1.0 (c) 2.0 (d) 3.0 (e) 4.0
8. Brass is an alloy containing copper and (a) zinc (b) tin (c) aluminum (d) silver (e) lead
9. $60cm^3$ of hydrogen are sparked with $20cm^3$ of oxygen at 100^0C and 1 atmosphere. The total volume of the residual gases is (a) $60cm^3$ (b) $10cm^3$ (c) $40cm^3$ (d) $30cm^3$ (e) $70cm^3$
10. If the diffusion of oxygen gas is taken as 1 what will be the rate of diffusion of methane whose relative molar mass is 16? (a) 2.0 (b) 1.8 (c) 1.4 (d) 1.0 (e) 0.5

USE OF ENGLISH

In each of question 11 to 20, choose the word(s) or phase(s) which best fill(s) the gap(s)

11. The sea wave continue to ---------- the cliff on the west coast constantly.
    (a) impair (b) rub (c) knock (d) erode
12. The college bus was travelling at a high ------- when the accident occurred.
    (a) velocity (b) acceleration (c) rapidity (d)speech
13. Note that only senior member of staff have the ---------- of using the toilet upstair.
    (a) permission (b) occasion (c) privilege (d) habit
14. The chief priest will ---------- the main into the cut today. (a) indoctrinate (b) usher (c) convert (d) initiate
15. Obi is noted for his ---------- attitude to his seniors at school
    (a) receptive (b) respectful (c) respective (d) respectable
16. The girl that my brother introduced to us last week is pretty ---------- ill-mannered
    (a) and (b) but also (c) as well as (d) respectable
17. The police report was -------- - to tat of the eye witness.
    (a) contrary (b) inconsistent (c) different (d) congruent
18. The African extended family system gives security to ---------- members. (a) his (b) her (c) its (d) their
19. I know I ---------- read more but I am tired (a) may (b) ought to (c) would (d) could
20. Insects can become ---------- to insecticides
    (a) immunized (b) resistant (c) reticent (d) immobilized

PHYSICS

21. Which of the following is a scalar quantity?
    (a) momentum (b) acceleration (c) displacement (d) distance (e) force
22. What change in velocity would produce a body of mass 4kg if a constant force of 16N acts on it for 2s?
    (a) $0.5ms^{-1}$ (b) $2.0ms^{-1}$ (c) $8.0ms^{-1}$ (d) $32.0ms^{-1}$ (e) $128.0ms^{-1}$

23. A body accelerates uniformly from rest at the rate of $3ms^{-2}$ for 8 seconds. Calculate the distance covered by the body during the acceleration. (a) 12m (b) 24m (c) 48m (d) 72m (e) 96m
24. Which of the following has the same units as the moment of a force?
(a) force (b) power (c) work (d) 72m (e) 96m
25. Which of the following will reduce the frequency of oscillation of a simple pendulum?
(a) increasing the mass of the bob (b) decreasing the mass of the bob (c) increasing the length of the string (d) decreasing the length of the string (e) increasing the amplitude of oscillation
26. A barometer can be used in determining the length of a I. mountain II. Depth of a mine III. Dew point. Which of the following is/are correct?
(a) I,II,III (b) II and III only (c). I and III only (d). I and II only. (e) III only.
27. Which of the following colours of surfaces will radiates heat energy best?
(a) red (b) white (c) black (d) yellow (e) blue
28. A gas which obeys Charles law exactly has volume of $283cm^3$ 10^0C. What is its volume at 30^0C?
(a) $142cm^3$ (b) $293cm^3$ (c) $303cm^3$ (d) $566cm^3$ (e) $849cm^3$
29. A real image of an object formed b y a converging lens of focal length 15cm is 3 times the size of the object. What is the distance of the object from the lens? (a) 30cm (b) 25cm (c)20cm (d) 15cm (e)10cm
30. How far from a cliff should a boy stand in order to hear the echo of his clap 0.9s later?
(speed of sound in air = $330ms^{-1}$) (a) 36.67m (b) 74.25 (c) 148.50m (d) 297.00m (e) 366.67m

MATHEMATICS

31. Find n if $34n = 10011_2$ (a) 5 (b) 6 (c) 7 (d) 8
32. The radius of a circle is given as 5cm subject to an error of 0.1cm. what is the percentage error in the area of the circle? (a) $^1/_{25}$ (b) $^1/_4$ (c) 4 (d) 25
33. What is the value of x satisfying the equation $^{4^{2x}}/_{4^{3x}} = 2$ (a)-2 (b) $^{-1}/_2$ (c) ½ (d) 2
34. If $x = 3 - \sqrt{3}$, find $x^2 + 36/x^2$. (a) 9 (b) 18 (c) 24 (d) 27
35. Solve the equation $y - 11y + 24 = 0$ (a) 8,3 (b) 64,9 (c) 6,4 (d) 9,-8
36. A man invested a sum of ₦ 280.00 partly at 5% and partly at 4%. If the total interest is ₦ 12.80 per annum, find the amount invested at 5% (a) ₦ 14.00 (b) ₦120.00 (c) ₦140.00 (d) ₦160.00
37. Ice forms on a refrigerator ice box at the rate of (4-061)g per minute after I minutes. If initially there were 2g of ice, find the mass of ice formed in 5 minutes (a) 19.5B (b) 17.0 (c) 14.5 (d) 12.5
38. Obtain a maximum value of the function $f(x) = x^3 - 12x + 11$ (a) -5 (b) -2 (c) 2 (d) 27
39. Two perfect dice were thrown together. Determine the probability of obtaining a total score of 8
(a) 1/12 (b) 5/36 (c) 1/6 (d) 7/36
40. The probability of an event P is ¾ while that of another event Q is $^1/_6$. If the probability of both P and Q is $^1/_{12}$, what is the probability of either P or Q? (a) 1/96 (b) 1/8 (c) 5/6 (d) 11/12

BIOLOGY

41. Which of the following organelles is used for locomotion in paramecium?
(a) pseudopodium (b) irichocyst (c) cilium (d) pellicle (e) contractile vacuole
42. Which of the following is not true of the nucleus of a living cell? It contains
(a) chromosomes (b) nucleus (c) nucleoplasm (d) chromatids (e) ribosomes
43. The cell membranes consist of (a) carbohydrates and lipids (b) vitamins and proteins (c) lipids and proteins (d) water and sugar (e) starch and cellulose
44. Which of the following is not likely to be found in the cell of a ripe tomato fruit?
(a) plastids (b) chlorophyll (c) cellulose cell wall (d) mitochondrion (e) mineral salts
45. Osmosis can be defined as diffusion of
(a) atoms and molecules through a membrane to an area of high concentration (b) water molecules for a dilute solution to a concentrated solution across a permeable membrane (c) water molecules from area of high concentration to an area of low concentration (d) water molecules from a dilute solution to a concentrated solution through a semi permeable membrane. (e) perspiration and excretion.
46. The movement of diaphragm is characteristics of gaseous exchange in
(a) insect (b) fish (c) toad (d) mammal (e) plants
47. In cellular respiration, energy is stored in the form of (a) adenosine di phosphate (ADP) (b) adenosine mono phosphate (AMP) (c) adenosine tri phosphate (ATP) (d) heat energy (e) electrical energy
48. The medium in which dissolved nutrient are transported in the body of vertebrates is called
(a) latex (b) urine (c) cell sap (d) blood (e) haemoglobin
49. Which of the following structures of the leaf contains air?
(a) guard cell (b) palisade layer (c) intercellular space (d) vascular bundle (e) upper epidermis
50. Which of the following organs is s, ecially adapted for gaseous exchange in aquatic organisms.
(a) lungs (b) trachea (c) gills (d) tracholes (e) alveoli

DETAILED SOLUTIONS TO DAY 1 FUTO POST UTME SCREENING TYPE B

CHEMISTRY

1. Total volume of mixture = $20cm^3 + 35cm^3 + 15cm^3 + 10cm^3 = 80cm^3$ mole fraction of H = $\frac{20cm^3}{80cm^3} = 0.25$----------D
2. Mass of Hydride = 0.07g
   mass of hydrogen = 14.29% x 0.07 = 0.01g
   mass of carbon = 0.07g-0.01g = 0.06g
   mole ratio of H = $\frac{0.01}{1} = 0.01$
   mole ratio of C = $\frac{0.06}{12} = 0.005$ ratio of mixture
   $C = \frac{0.005}{0.005} = 1$; $H = \frac{0.01}{0.005} = 2$
   Empirical formula = CH_2 ; RMM = (12+1x2)n = 56; 14n=56; n=56/14 = 4 ; molecular formula = $(CH_2)4 = C_4H_8$
3. $V_I = 100cm^3$ $T_1 = 35^0C$ $P_I = 750mm$ $P_2 = 1000mmHg$; $\frac{P_IV_I}{T_I} = \frac{P_2V_2}{V_2}$ at constant temperature $P_IV_I = P_2V_2 \therefore V_2 = \frac{P_IV_I}{P_2}$;
   $V_2 = \frac{750\ X\ 100}{1000}\ 75cm^3$----------C
4. C--- ionic, covalent and co-ordinate
5. D---- nitric acid to sodium hydroxide note neutralization reaction is reaction of acid & base
6. C---- Dehydrating agent
7. C----2.0
8. A---- Zinc
9. E------ $70.Cm^3$
10. D----- 1.0 molar mass of oxygen is 16 and rate of diffussion1 since the molar mass of methane is 16 the rate is likely to be 1 also.

USE OF ENGLISH

11. D---erode
12. D----speed
13. A-----permission
14. D----initiate
15. B---respectful
16. B-----but also
17. A-----contrary
18. C----its
19. B----- ought to
20. B--- resistant

PHYSICS

21. C----------displacement
22. m= 4kg F= 16N t=25;
    Change in velocity = V-U. F= ma=m$\frac{(V-U)}{t}$;
    V-u $\frac{ft}{m} = \frac{16x2}{4} = 8m/s$----------C
23. U=0 a=$3ms^{-2}$; t=8s; S=ut+½at^2;
    0+½ x$3ms^{-2}$ x $(8)^2s^2$; = 96m ..... E
24. C-------work
25. C-------- increasing the length of the string
26. E-------iii only
27. C-----black
28. $V_1 = 283cm^3$ $T_1 = 10^0C - 283k$;
    $T_2 = 30^0C = 303k$; $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ $V_2 = \frac{V_1xT_2}{T_1}$
    $V_2 = \frac{282\ x303}{283} = 303cm^3$----------C
29. F= 15cm m=3; $M\frac{V}{U} = V\left(\frac{1}{U}\right)$; $\frac{1}{F} = \frac{1}{U} + \frac{1}{V}$
    $\therefore\ M = V\left(\frac{1}{U}\right) = V = \left(\frac{1}{F} - \frac{1}{V}\right) = \frac{V}{F} - 1$
    $\Longrightarrow 3 = \frac{V}{15}1\ \frac{V}{15} = 4\ \ V = 60CM$;
    where V = image distance and U = object distance
    $\therefore M = \frac{V}{U} = \frac{60cm}{U} = 3$; U = $\frac{60cm}{3}$ = 20cm -------C
30. V = $\frac{d}{t}$ d= v x t; V= $330ms^{-1}$; t=0.9s;d = 330x0.9 = 297m ;The distance from the boy to the cliff is half of the total distance; d = $\frac{297}{2}$ = 148.5m -------C

MATHEMATICS

31. 10011_2 to base ten; 1 x 2^4 + 1x 2^1+1x2^0; 6 + 2+1 = 19; 34n to base ten = 3xn^1+ 4n^0= 3n+4; $\therefore$ 3n + 4 = 19; 3n = 15 n=5 ----------A
32. Area =$\pi r^2 = \pi\ x\ 5\ x\ 5 = 25\pi$;
    area of error = $\pi\ x\ 0.1^2 = 0.01\pi$;
    $\therefore\ \%\ error = \frac{0.01\pi}{25\pi}\ x\ 100 = \frac{0.01}{25}\ x\ 100 = \frac{1}{25}$--------A
33. $4^{2x} \div 4^{3x} = 2$; $2^{4x} \div 2^{6x} = 2^1$; $2^{4x-6x} = 2^1$; 4x-6x = 1; 2x= 1.$\therefore$ x = $^{-1}/_2$----------B
34. x=3-$\sqrt{3}$; x^2+ $36/x^2$; $x^2 = (3-\sqrt{3})^2$
    $= 9 - 6\sqrt{3}\ \ + 3 = 12 - 6\sqrt{3} \therefore \frac{12-6\sqrt{3}}{1} + \frac{36}{12-6\sqrt{3}}$
    $= \frac{144-144\sqrt{3}\ +108+36}{12-6\sqrt{3}}$; $\frac{288-144\sqrt{3}}{12-6\sqrt{3}} = \frac{24(12-6\sqrt{3})}{12-6\sqrt{3}}$; = 24.. C
35. y^2-11y + 24=0; ; $y^2 - 3y - 8y + 24 = 0$; $(y^2 3y) + (-8y + 24) = 0$; Y (y-3)-8 (y-3) =0; (y-8)(y-3) =0 ; Y = 8 or 3----------A
36. Principal of 5% = x; Principal of 4% = 280 - x; Interest of 5% = $\frac{x-5}{100}$ Interest of 4%= $\frac{(280-x)x\ 4}{100}$; Total interest = 12.80, t=1
    $\therefore\ \frac{5x}{100} + \frac{4(280-x)}{100}$ = ₦ 12.80; x + 1120 = ₦ 1280; X = ₦ 1280 - ₦ 1120 = ₦ 160 ----------D
37.
38. F(x) =x^3- 12x + 11; $\frac{dy}{dx} = 3x^2 - 12$; $3x^2$-12=0 ; $3x^2 = 12$, $x^2 = 4$ X = ± 2
    for x = + 2; $(2)^3 - 12\ (2) + 11 = -5$;
    for x =-2 $(-2)^3$-12(-2) + 11 = 27
    $\because$ the max value =27----------D
39. B--------$^5/_{36}$
40. C--------$^5/_6$

BIOLOGY

41. C	42 D	43 C	44.B
45. D	46D	47 C	
48D	49C	50.C	

DAY 2 FUTO 2011/2012 POST UTME SCREENING TYPE B

FOR CANDIDATES OF: MECHANICAL ENGINEERING (MEE) CIVIL ENGINEERING (CIE) FOOD SCI.& TECHNOLOGY (FST) POLYMER AND TEXTILE (PTE) ENVIRONMENTAL TECHNOLOGY (EVT)

Answer all questions: shade the appropriate with HB pencil only. Time allowed: 35minutes

BIOLOGY

1. The organ which is sensitive in light is the
   (a) gullet (b) chloroplast (c) eye spot (d) contractile vacuole (e) flagellum
2. Which of the following is a similarity between a typical animal cell and a typical plant cell? Presence of
   (a) cellulose (b) chlorophyll (c) centrally placed nucleus (d) cell membrane (e) large vacuole
3. The first scientist to describe the cell was
   (a) Theodore Schwann (b) Felix Dujardin (c) Robert Hooke (d) Charles (e) Mattlas Schleden
4. In which of the following parts of the cell is the chromosomes found?
   (a) nucleus (b) golgi body (c) cytoplasm (d) cell membrane (e) cell wall
5. Which of the following disease is caused by deficiency of insulin in the body?
   (a) malaria (b) diabetes mellitus (c) hepatitis (d) gonorrhea (e) cholera
6. The respiratory organ found in the cockroach is the
   (a) air sac (b) trachea (c) lung book (d) lung (e) gill
7. Which of the following structures function as an excretory system found in flat worms?
   (a) contractile vacuole (b) nephridium (c) flame cell (d) malphighian tubule (e) kidney
8. Which of the following organ is associated with deamination of proteins?
   (a) lungs (b) stomach (c) kidney (d) liver (e) heart
9. Ultra filtration in the kidney takes place in the
   (a) loop of Henle (b) renal vein (c) Bowman's capsule (d) pelvis (e) pyramid
10. The groups of sensory cells found on the upper surface of the tongue are called
    (a) ampullae (b) taste buds (c) nerve cells (d) somatic cells (e) tactile cells

MATHEMATICS

11. If 263+441 = 714, what number base has been used? (a) 12 (b) 11 (c) 100 (d) 9 (e) 8
12. P sold his bicycle to Q at the profit of !0%, Q sold it to R for ₦209.00 at a loss of 5%. How much did the bicycle cost P? (a) ₦ 200.00 (b) ₦ 196.00 (c) ₦ 180.00 (d) ₦ 205.00 (e) ₦ 150.00
13. A man invested a total of ₦ 50,000.00 in two companies. If these companies pay dividends of 6% and 8% respectively, how much did he invest at 8%, if the total yield is ₦ 13,700.00.
    (a) ₦ 15,000.00 (b)₦21,400.00 (c) ₦ 27,800.00 (d) ₦ 29,000.00 (e) ₦ 135,000.00
14. Thirty boys and X girls sat for a test. The mean of the boys' score and that of the girls were respectively 6 and 8. Find if the total score was 468. (a) 38 (b) 24 (c) 36 (d) 22 (e) 41
15. James choose at random, a number between 1 and 300. What is the probability that the number is divisible by 4?
    (a)1/3 (b) 1/4% (c) 1/5 (d) 4/300 (e) 1/300
16. P varies directly as the square of Q and inversely as R. if P=36 when Q = 3 and R=4, find P when Q = 5 and R =2.
    (a) 72 (b) 100 (c) 90 (d) 200 (e) 125
17. Factorize $6x^2 - 14x - 12$ (a) 2(x+3)(3x-2) (b) 6(x-2)(x+1) (c) 2(x-3)(3x+2) (d) 6(x+2)(x-1) (e)(3x-4)(2x+3)
18. If 2x+3y = 1 and x-y-11, find (x+y) (a) 5 (b) -3 (c) 8 (d) 2 (e) -2
19. Find a factor which is common to all 3 binomial expression $4a^2 - 9b^2, 8a^3 + 27b^3, (4a + 6b)^2$ (a) 4a+6b
    (b) 4a-6b (c) 2a+3b (d) 2a-3b (e) none
20. A cone is formed by bending a sector of a circle having an angle or 210^0. Find the radius of the base of the cone. If the diameter of the circle is 12cm. (a) 7.00cm (b) 1.75cm (c) 21cm (d)3.50cm (e)2.21cm

USE OF ENGLISH

From the alternatives provided in questions 21-30 select the one which most appropriately completes the sentences.

21. I was seriously disappointed when the ---------- between the two teams ended in a goalless draw
    (a) march (b) marsh (c) match (d) mass (e) martch
22. Children's clothes have to be strong to stand ---------- rough use.
    (a) with (b) in through (c) in for (d) up to (e) up for
23. Shall I make the cheque----------you or to your firm. (a) in for (b) up with (c) in with(d) up for (e) out to
24. The hotel ---------- is at creek road
    (a) which I a staying (b) in where I an staying (c) that I am staying (d) at which I am staying (e) I stay

25. ---------- the main points of the lecture given by the director of the institute
(a) those were (b) that was (c) there were (d) this was (e) that is
26. I am sure that my mother will not find out. She is so ---------- that she will accept anything I tell her.
(a) credible (b) credulous (c) creditable (d) incredible (e) incredulous
27. The boys are very naughty. they have started fighting again----------
(a) haven't they? (b) isn't it (c) not so (d) have they (e) is it
28. If only I ---------insured, but I wasn't. now I have to pay a lot of money.
(a) am (b) have been (c) had been (d) would be (e)was to be
29. Do you mind if I wait for the reply? I'd rather you---- again tomorrow.
(a) called (b) will call (c) can call (e) were calling
30. The young man looked carefully at the document, but he couldn't make ------- what it meant
(a) up (b) out (c) off (d) though (e) do.

PHYSICS

31. An object of mass O.40gk attached to the end of a string is whirled round in a horizontal circle of radius 2.0m with a constant speed of $3ms^{-1}$. Calculate the angular velocity of the object.
(a) $0.8rad\,s^{-1}$ (b) $2.0rad\,s^{-1}$ (c) $4.rad\,s^{-1}$ (d) $8.orad\,s^{-1}$ (e) $16.0rad\,s^{-1}$
32. An object falls freely from a height of 25m into the roof of a building 5m high. Calculate the velocity with which the object strikes the roof. ($g=10ms^{-2}$)
(a) $17.3ms^{-1}$ (b) $20.0ms^{-1}$ (c) $24.5ms^{-1}$ (d) $125.0ms^{-1}$ (e) $200.0ms^{-1}$
33. Two forces 3N and 4N act on a body in directions due north of east respectively. Calculate their equilibrium
(a) $5N.54^0$ East of north (b) $5N.53^0$ west of south (c) $5N.37^0$ north of east
(d) $7N.37^0$ west of north (e)$7N.37^0$ south of west
34. A solid plastic cube of 0.2m is submerged in a liquid of density 0.8km. Calculate the up thrust of the liquid on the cube ($g= 10ms^{-2}$) (a) 0.064N (b) 0.025N (c) 0.016N (d) 0.008N (e) 0.003N
35. Calculate the quantity of heat released when100g of steam at 100^0 C condenses to water
(Take the specific latent hat of vapourization of water as 3.3 x 10 kg)
(a) $2.3 \times 10^2 j$ (b) $2.3 \times 10^2 j$ (c) $2.3 \times 10^4 j$ (d) 2.3×10^5 (e) $2.3 \times 10^7 j$
36. A fixed mass of gas occupies a volume of 20cm at a pressure of 700mmHg. Assuming that the temperature remains constant, what will be the volume of the gas at 750mmHg?
(a) 2.5cm (b) 15.5cm (c) 18.7cm (d) 21.4cm (e) $72.5cm^3$
37. When white light is incident on a glass prism the spectrum produced on a screen placed beyond the prism is due to
(a) diffraction (b) reflection (c) refraction (d) polarization (e) interference
38. Two identical waves travelling in the same direction are super imposed. What should be the phase difference between the waves for maximum destructive interference to occur?
(a) 20^0 (b) 45^0 (c) 180^0 (d) 255^0 (e) 270^0
39. In a photocell energy is converted to (a) electrical energy (b) chemical energy (c) heat energy (d) mechanical energy (e) kinetic energy
40. The odour of a leaking gas is perceived at a distance from the source. This is made possible by the process of
(a) sublimation (b) diffusion (c) osmosis (d) evaporation (e) capillarity

CHEMISTRY

41. A brand of ink containing cobalt (II). Copper (II) ions can be separated into its various components by
(a) fractional crystallization (b) fractional distillation (c) sublimation (d) chromatography
42. Which of the following substances is a mixture?
(a) granulated sugar (b) sea water (c) sodium chloride (d) iron fillings
43. If the quantity of oxygen occupying a 2.71 container at a pressure of 0.825 atmospheres and 300k is reduced one half, what is pressure exerted by the remaining gas?
(a) 1.650atm (b) 0.825atm (c) 0.413atm (d) 0.275atm
44. Which of the following substances has the lowest vapour density?
(a) ethanoic acid (b) propanol (c) dichloro methane (d) ethanol (O=16, Cl = 35.5, H= 1, C = 12)
45. The atomic numbers of two element X and Y are 12 and 9 respectively . the bond in the compound formed between the atoms of these two element is (a) ionic (b) covalent (c) neutral (d) co-ordinate
46. The grater the difference? In electrons negatively between bonded atoms, the (a) lower the polarity of the bond (b) higher the polarity of the bond (c)weaker the bond (d) higher the possibility of the substances formed being a molecule
47. In the purification of town water supply, alum is used principally to (a) kill bacteria (b) control the PH water (c) improve the taste of the water (d) coagulate small particles of mud
48. Oil spillage in ponds and creek can be cleaned up by (a) burning off the oil layer (b) spraying with detergent (c) dispersal with compressed air (d) spraying with hot water
49. The solubility of Na_3AsO_4 in the ethanol? (a) 87.2% (b) 38.9% (c)19.1% (d) 13.7% (As= 75, Na=23, O=16, H=1)
50. The basicity of tetraoxophosphate (vi) acid is (a) 7 (b) 5 (c) 4 (d) 3

DETAILED SOLUTIONS TO DAY 2 FUTO POST UTME 2011/2012 SCREENING TYPE B

BIOLOGY

1. E-flagellum
2. D-cell membrane
3. C- Robert Hooke
4. A- nucleus
5. B- diabetes melitus
6. B-trachea
7. C- flame cell
8. D- liver
9. C-Bowman's capsule
10. B-taste buds

Mathematics

11. $2\ 6\ 3_9$ / $4\ 4\ 1_9$ / $7\ 1\ 4_9$ ..... D

12. Q to R % less $= \frac{C.P-S.P.}{C.P}$; $\frac{5}{100} = \frac{C.P-N209}{C.P}$;
5C.P = 100C.P – N 20,900; N 20,900=95C.P;
C.P = N220; S.P of P = N220 ;
P TO Q: % profit $= \frac{S.P-C.P}{C.P}$; $\frac{10}{100} = \frac{N220-C.P}{C.P}$;
10 C.P = N= 22000-400C.P;
110C.P = N22000; C.P = N200 ----------A

13. 35,000----------E

14. let the number of girls=A;
Total score of boys = 30 x6 = 180 ;
Total score of girls = A x 8 = 8A;
180+ 8A = 468; ; 8A= 288; A=36----------A

15. Nos from 1-300 that is divisible 4 $= \frac{300}{4} = 75$;
By 4 $= \frac{300}{4} = 75$; P $= \frac{75}{300} = \frac{1}{4}$ ----------B

16. P $\alpha \frac{Q^2}{R}$; P $= \frac{KQ^2}{R}$; 36 $= \frac{K3^2}{4}$; K $= \frac{36 \times 4}{9}$;
K = 16 ; P $= \frac{16 \times 5^2}{2} = 200$----------D

17. $6x^2 - 14x - 12$; $2(3x^2 - 7x - 6)$;
$2((3x^2 - 9x) + (2x - 6))$; 2(3x(x-3) + 2(x-3)
; 2 (3x+ 2) (x-3) ----------C

18. 2x + 3y = 1
x+ y = 11
∴ 2x + 3y = 1
- 2x - 2y = 22
5y = -21
Y $= \frac{-21}{5}$; x = 11 – y; x =11 + $\frac{21}{5} = \frac{76}{5}$;
∴ x+ y $= \frac{76}{5} - \frac{21}{5} = \frac{55}{5} = 11$

19. 2a+3b C

20. The circumference of the cone
= the length of the arc $= 2\pi r = \frac{\theta}{360} x 2\pi r$;
$= 2\pi r = \frac{210}{360} x\ 2\ x\ \frac{22}{7}\ x\ 6$;
(N.B radius = diameter/2) $2\pi r = 22$;
$r = \frac{22}{2} x \frac{7}{22} = \frac{7}{2} = 3.50cm$ ----------D

USE OF ENGLISH

21. C-match
22. E- up for
23. E – out to
24. A- which am staying
25. A-those were
26. B-credulous
27. A-haven't they
28. C-had been
29. A-called
30. B-out

PHYSICS

31. E-16.0$rads^{-1}$
32. u=0 ms^{-} ; s = 25m - 5m = 20m, g = 10m/m^2
$v^2 = u^2 + 2gs$; $v^2 = 0 + 2x\ 10\ x\ 20$; $v^2 = 400$
$v = 20ms^{-}$ ------B

33. $x^2 = 3^2 + 4^2$; x = $\sqrt{9 + 16} = \sqrt{25} = 5$;
$\theta = tan^{-1}\frac{3}{4} = tan^{-1}\ 0.75 = 37^0 = 5N.37^0$
North of east ------C

34. Volume of cube = 0.2 x 0.2 x 0.2 = 0.008m^3;
density ρ $= \frac{m}{v}$; m = pxv ;
m = 0.8 x 0.008 = 0.00064g;
upthrust = mg = 0.0064 x 10 = 0.064N----------A

35. $2.3 \times 10^4 J$ C

36. P_1 = 700mmHg , v_1 = 20cm ; p_2 = 750mmHg
v_2? $v_2 = \frac{p_1 v_1}{p_2} = \frac{700 \times 20}{750}$ = 18.7cm----------C

37. A---------- diffraction
38. D----------255^0
39. A----------electrical energy
40. B----------diffusion

CHEMISTRY

41. D----------chromatography
41. B----------sea water
43. V_1 = 2.71 P_1 = 0.825 atm T=300k
V_2 = 2.71/2 P_2=?
From the idea gas equation $= \frac{P_1 V_1}{P_2 V_2} = \frac{T_1}{T_2}$
$= \frac{0.825\ X\ 2.7}{P_2 X (2.7 \div 2)} = \frac{300}{273}$; $P_2 = \frac{0.825\ X\ 2.7\ X\ 273}{300\ x\ (2.7 \div 2)}$ 1.5015 atm
44. C-------dicloromethane
45. A ----------ionic blood
46. D- higher the possibility of the substances formed being a molecule
47. D-------coagulate small particles
48. B ---- spraying with detergent
49. mm crystal salt= 424gmol^{-1} ;
mm of anhydrous salt = 208gmol-1
if 38.9g of H_2O → 1 mole of H_2O
xg of H2O → 1 mole of anhydrous salt
Xg = 38.9g; No of moles $= \frac{mass}{molar\ mass}$;
X $= \frac{38.9}{208} = 0.138$ %mass = 0.138 x 100 ≈ 13.8% D
50. 3---------- D

DAY 3 FUTO 2011/2012 POST UTME SCREENING TYPE A

FOR CANDIDATES OF : ALL DEPARTMENT IN SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY(SAAT) ,SCHOOL OF HEALTH TECHNOLOGY (SOHT), SCHOOL OF SCIENCE (SOSC), SCHOOL OF ENVIRONMENTAL TECHNOLOGY (SOET)& SCHOOL OF MANAGEMENT (SMAT)

Answer question: shade the answer sheet as appropriate with HB pencil only
In each of question 1 to 10, fill each gap with the most appropriate option from the list following the gap.

USE OF ENGLISH

1. I have no respect for individual who are too ----------
(a) compliance (b) compliant (c) compliable (d) complicated
2. The police men who were to keep watch connived ---------- the robbers escape.(a) with b) at(c) to (d) for
3. Ekatte is ----------to acquire knowledge, but also eager to display it.
(a) not only anxious (b) anxious not only (c) not only that she is (d) anxious
4. Ifenyiwa will not come ---------- she is asked (a) after (b) provided (c) unless (d) because
5. You must forbid---------- coming (a) he's (b) that he is (c) him for (d) his
6. Obi should leave for New York on Friday --------- being equal
(a) all the things (b) all other things (c) other things (d) other things all
7. The woman warned her daughter not to ---------- with bad boys
(a) move (b) be moving (c) be keeping company (d) keep company
8. Tamuno is crying because his mother was killed in a ---------- accident
(a) motor (b) traffic (c) motor vehicle (d) road
9. Micheal is not very bold. He's not ---------- a rough life
(a) cut up for (b) cut for (c) off for (d) cut out for
10. Some of the food ---------- spoilt (a) is (b) are (c) were (d) have

BIOLOGY

11. Which of the following levels of organization in things is in correct sequence, starting from the most complex to the simplest? (a) tissue→ cell → system (b) system →organ →tissue → cell (c) cell → $tissue \rightarrow system \rightarrow organ$ (d) cell→ $tissue \rightarrow organ \rightarrow system$ (e) organ → $system \rightarrow tissue \rightarrow cell$
12. A few drop of fehling was added to juice extract from fresh maize grain and boiled. A red precipitate was formed, indicating the presence of (a) alcohol (b) protein (c) non reducing sugar (d) starch
13. Which of the following is not a cell organelle
(a) golgi bodies (b) nucleus (c) fat droplets (d) ribosomes (e) endoplasmic reticulum
14. Which of the following are the final products of aerobic respiration
(a)water, carbon dioxide and energy (b) pyruvic acid , carbon dioxide and water (c) glucose, energy and urea (d) energy and carbon dioxide (e) lactic acid, water and carbon dioxide
15. Movement of water across a semi permeable membrane from a weaker solution to a stronger solution is know as (a) transpiration (b) diffusion (c) active transport (d) plasmolysis (e) osmosis
16. In which of the following structures will cells undergoing melosis be seen?
(a) at the apices of stem and root (b) in the cortex of the stem (c) in the pallsade mesophyll of the leaf (d) in the ovary of a flower (e) in the root of a seedling
17. Which of the following instrument can be used to perform an experiment on geotropism?
(a) photometer (b) cup anemometer (c) klinostat (d) kymograph (e) sphygmomanometer
18. The thoracic vertebra differs from all the other vertebrae by the possession of (a) long neural spine (b) odontold process (c) vertebraterial canal (d) large centrum (e) transverse processes
19. The maintenance of a constant internal environment of an organism is known a
(a) homeostasis (b) hemorhesis (c) turgidity (d) homothermy (e) dieresis
20. The most sensitive part of the retina is called
(a) blind spot (b) conjunctiva (c) fovea centralis (d) chorold coat (e) sclerotic coat

CHEMISTRY

21. Which of the following substances is not a homogenous mixture
(a) filtered sea water (b) soft drink (c) flood water (d) writing ink
22. There is a large temperature interval between the melting point ad the boiling of a metal because

(a) metals have very high met points (b) metal conduct heat very rapidly (c) melting does not break the metallic bond but boiling does (d) the crystal lattice of metals is easily broken

23. How many moles of (H^+) are there in $1dm^3$ of 0.5M solution of H_2SO_4
(a) 2.0moles (b) 1.0moles (c) 0.5moles (d) 0.25moles

24. A given mass of gas occupies $2dm^3$ at 300K. at what temperature will its volume be doubled, keeping the pressure constant (a) 400K (b) 480K (c) 550K (d) 600K

25. If $100cm^3$ of oxygen pass through porous plug in 50seconds, the time taken for the same volume of hydrogen to pass through the same porous plug is (a) 10.0s (b) 12.5s (c) 17.7s (d) 32.0s

26. Which of the following is a measure of the average kinetic energy of the molecules of a substance?
(a) volume (b) mass (c) pressure (d) temperature

27. How many lone pairs of electrons are there on the central atom of the molecule? (a) 1 (b) 2 (c) 3 (d) 4

28. Four element P,Q, R and S have 1,2,3 and 7 electrons in their outermost cell, respectively. The element which is likely to be a metal is (a) P (b) R (c) Q (d) S

29. Which of the following gases dissolves in water vapour to produce acid rain during rainfall?
(a) oxygen (b) carbon (II) oxide (c) Nitrogen (d) sulphur (IV) oxide

30. Water for town supply is chlorinated to make it free from
(a) bad odour (b) bacteria (c) temporary hardness (d)permanent hardness

PHYSICS

31. Which of the following physical processes cannot be explained by the molecular theory of matter?
(a) evapouration (b) thermal conduction (c) radiation of heat (d) convectional current in fluids

32. A spring balance which is suspended from the roof of a lift carries a mass of 1kg at its free end. If the life accelerates upward at $2.5ms^{-1}$ determine the reading on the spring balance (g=$10ms^{-2}$)
(a) 25.0N (b)12.5N (c) 7.5N (d) 4.0N

33. An object of weight 10N immersed in a liquid displaces a quantity of the liquid. The liquid displaced weighs 6N, determine the up thrust on the object. (a) 20N (b) 40N (c) 6N (d) 4N

34. Which of the following statements about pressure is not correct? Pressure
(a) increases with an increase area (b) decreases with an increase in surface area (c) increases with a decrease in surface area (d) increases with an increase in the applied force

35. A block weighting 15N rests on a flat surface and a horizontal force of 3N is exerted on it. Determine the frictional force on the block (a) 0.3N (b) 0.5N (c) 3.0N (d) 5.0N

36. The time rate of change of momentum is (a) impulse (b) force (c) power (d) pressure

37. Electrical resistance is a property of an electrical conductor that causes electrical energy to be converted into (a) mechanical energy (b) heat energy (c) magnetic energy (d) chemical energy

38. A simple machine with an efficiency of 75% lifts a load of 5000N when a force of 500N is applied to it. Calculate the velocity ratio of the machine (a) 10.0 (b) 13.3 (c) 17.5 (d) 25.0

39. The amount of heat given out or absorbed when a substance change its state at a constant temperature is known as (a) latent heat (b) heat capacity (c) specific latent heat (d) specific heat capacity

40. Which of the following physical quantities affect the saturated vapour pressure of a liquid?
(a) temperature (b) volume (c) mass (d) density

MATHEMATICS

41. Simplify $3\,{}^{1}/_{2} - 1\,{}^{1}/_{4} \times 1/3 + 12/3$ (a) 2 (b) 3 (c) 4 (d) 6

42. Express 62÷3 as a decimal correct to 3 significant figures (a) 20.6 (b) 20.667 (c) 20.67 (d) 20.7

43. Obi borrows N10.00 at 2% per month simple interest and repays N 8.00 after 4 month, how much does he still owe? (a) 10.80 (b) 10.65 (c) 2.80 (d) 2.67

44. Which of the following is a factor of rs + tr- pt- ps? (a) (p-s) (b) (s-p) (c) (r-p) (d) (r+p)

45. Find the positive number n such that thrice its square is equal to 12 times the number (a) 1(b) 2(c) 3 (d) 4

46. Find the gradient of the line passing through the points (-2,0) and (0,-4) (a) 2 (b) -4 (c) -2 (d) 4

47. At what value of x is the function $y=x^2 - 2x - 3$minimum? (a) 1 (b) -1 (c) -4 (d) 4

48. Find the sum of the 20 terms in an arithmetic progression whose first term is 7 and last term 117?
(a) 2480 (b) 1240 (c) 620 (d) 124

49. Find the total area of the surface of a solid cylinder base radius is 4cm and height is 5cm.
(a) $56\pi cm^2$ (b) $72\,\pi cm^2$ (c) $96\,\pi cm^2$ (d) $192\,\pi cm^2$

50. A crate of soft drink contains 10 bottles of coca cola, 8 of fanta and 6 of sprite. If one bottle is selected at random what is the probability that it is NOT a coca cola bottle? (a) ${}^{5}/_{12}$ (b) ${}^{1}/_{3}$ (c) ${}^{3}/_{4}$ (d) ${}^{7}/_{12}$

DETAILED SOLUTIONS TO DAY 3 FUTO POST UTME 2011/2012 SCREENING TYPE A

Use of English

1. D – Complicated
2. A – with
3. A - not only anxious
4. C – unless
5. D – his
6. C – other things
7. D – keep company
8. A – motor
9. A – cut up for
10. D – have

BIOLOGY

11. B – system >organ>tissue>cell
12. C – None reducing sugars
13. C – fat droplets
14. A – water, carbon dioxide, and energy
15. E – osmosis
16. D – in the ovary of a flower
17. A – photometer
18. A – long neural spine
19. A – homeostasis
20. C – fovea centralis

CHEMISTRY

21. C – flood water
22. C – melting does not break the metallic bond but boiling does
23. No of moles $= \frac{volume\ of\ solvent}{molarity} = \frac{1dm^3}{0.5} = 2.0$ moles **(A)**
24. $V_1 = 2dm^3;\ T_1 = 300K\ ;\ V_2 = (2dm^3)2;\ T_2 = ?$

    $from\ charles\ law\ V\alpha T\ \ {}^{V_1}/_{T_1} = {}^{V_2}/_{T_2}$

    $\rightarrow {}^{2}/_{300} = {}^{4}/_{T_2};\ T_2 = 300 \times {}^{4}/_{2} = 600K$ ..... **D**
25. B - 12.5sec
26. C – pressure
27. C – 3
28. B – A
29. D – sulphur (iv) oxide
30. B – bacteria

PHYSICS

31. C – radiation of heat
32. C – 7.5 N
33. W of object in air = 10N ;
    W of object in water= W of liquid displaced = 6N
    Upthrust = 10N- 6N = 4N **(D)**
34. A – increases with an increase in surface area
35. Frictional force $= \frac{weight\ of\ object}{applied\ force} = \frac{15N}{3N} = 5N$ **(D)**
36. A – impulse
37. B – heat energy
38. $\epsilon = \frac{M.A}{V.R} \rightarrow \epsilon = 75\%\ ;\ M.A = \frac{LOAD}{EFFORT} = \frac{5000N}{500N} = 10$

    $V.R = \frac{M.A}{E} = \frac{10}{75\%} = \frac{10}{0.75} = 13.3$ .... **B**
39. A – latent heat
40. D – density

MATHEMATICS

41. $3\frac{1}{2} - 1\frac{1}{4} \times \frac{1}{3} + 1\frac{2}{3} = 3\frac{1}{2} - \frac{5}{4} \times \frac{1}{3} + 1\frac{2}{3}$

    $= 3\frac{1}{2} - \frac{5}{12} + 1\frac{2}{3} = 4\frac{6-5+8}{12} = 4\frac{9}{12} = 4\frac{3}{4}$
42. $62 \div 3 = 20.6666667$; 3.s.f = 20.7 **(D)**
43. S.I $= \frac{P \times R \times T}{100}$; P = N10; R=2% ; T = 4months

    S.I $= \frac{10 \times 2 \times 4}{100}$ =N0.80

    Amount = p + S.I = N10 + N0.80 = N10.80

    Amount owed = 10.80 – N8 = N2.80.....**(C)**
44. rs + tr – pt - p =r(s+t) - p(t+s)

    = (r-p)(s-t) = (r-p) ..... **(C)**
45. let the no = n

    $3n^2 = 12n;\ N^2 = 12n/3 = 4n$

    $N^2 = 4n\ \therefore n^2 - 4n = 0$

    n(n-4)= 0; n=0 ; n=4 .....**(D)**
46. Grad $= \frac{\Delta y}{\Delta x} = \frac{-4-0}{0-(-2)} = \frac{-4}{2} = -2$ **(C)**
47. $y = x^2 - 2x - 3\ ;\ \frac{dy}{dx} = 2x - 2;\ 2x - 2 = 0$

    $2x = 2\ ;\ \therefore x = 1$ ..... **(A)**
48. $S_n = \frac{n}{2}(a + l)\ ;\ S_{20} = \frac{20}{2}(7 + 117)$

    $= 10(124) = 1240$ .... **(B)**
49. Area of the surface of a cylinder

    $= 2\pi rh + 2\pi r^2 = 2\pi(rh + r^2)$

    $= 2\pi(5 \times 4 \times 4^2) = 72\pi cm^2$ ..... **(B)**
50. C=10, F=8, S=6

    Total =10 +8+6= 24, Prob of C $= \frac{10}{24} = \frac{5}{12}$

    Prob that is not C $= 1 - \frac{5}{12} = \frac{7}{12}$ ..... **(D)**

OVERCOMING THE FEAR OF FAILING EXAMS

Fear is a deadly disease if left unattended can paralyze your power to reason and even tear down your physical power it is the duty of every individual to conquer this common enemy in his / her own mind.

Fear is the major contributor to failure in examinations, when you are living in fear, your physical and mental functions are disturbed and in the end you become helpless in action, this means that you cannot study, plan or do anything constructive apart from thinking in negative terms. You can turn your fears into courage, something you constructive. After all, why should you waste your mental energy fearing something you don't know or have no experience of.

You must **learn to rise above your fears**. One way of doing it, is to get facts about the exams as you are doing now, this will help you overcome exam anxiety.

FUTO 2010/2011 POST – UTME SCREENING TYPE A

Answer all questions: shade the answer sheet as appropriate with HB pencil only,
Thurs. 29th July, 2010. Time Allowed: 35 min.

PHYSICS

1. Shadows and eclipses result from the
   [A] refraction of light [B] rectilinear propagation of light [C] diffraction of light [D]reflection of light.
2. An object, which is 3cm high is placed vertically 10cm in front of a concave mirror. If this object produces an image 40cm from the mirror, the height of the image is
   [A] 0.75cm [B] 4.00cm [C] 8.00cm [D] 12.00cm
3. A boy looks at the image of an object in a plane mirror. He observes two images, a main bright one and the other faint. The observed images result from
   [A] reflection only [B] refraction only [C] diffraction and interference [D] reflection and refraction.
4. What must be the distance between an object and a converging lens of focal length 20cm to produce an erect image two times the object height? [A] 20cm [B] 15cm [C] 10cm [D] 5cm.
5. For a shortsighted person, light ray from a point on a very distant object is focused.
   [A] in front of the retina [B] on the retina by a converging lens
   [C] behind the retina by a diverging lens [D] in front of the retina at a distant of 2F from the lens.
6. When light is incident on an object, which is magenta in color, which of the following colors would be absorbed? [A] Red and blue [B] green only [C] red and green [D] red only.
7. In a resonance tube experiment, the effective length of the air column for the first resonance is 20cm when set into vibration by a tuning fork of frequency 480Hz. Neglecting end effect, the velocity of sound in air is [A] $96ms^{-1}$ [B] $255ms^{-1}$ [C] $340ms^{-1}$ [D] $384ms^{-1}$.
8. A sonometer wire of length 100cm under a tension of 10 N, has a frequency of 250Hz. Keeping the length of the wire constant, the tension is adjusted to produce a new frequency of 350Hz. The new tension is [A] 5.1N [B] 7.1N [C] 14.0N [D] 19.6N.
9. One of the properties of the earth's magnetic field is that the
   [A] north pole lies in the northern hemisphere [B] geographic and magnetic meridians coincide
   [C] earth's magnetic flux is entirely horizontal at a place where the magnetic dip is zero
   [D] earth's magnetic flux is entirely vertical at a place where the magnetic dip is zero.
10. Three cells each of e.m.f 1.5V and an internal resistance of 1.0Ω. are connected in parallel across a load of resistance 2.67Ω. Calculate the current in the load [A] 0.26A[B] 0.41A [C] 0.50A [D] 0.79A.

USE OF ENGLISH

11. A government spokesman announced that efforts --------- the release of the hostages is continuing.
    [A] to obtain [B] in obtaining [C] for obtaining [D] of obtaining
12. I know you think I an talking nonsense , Shehu, but ---------- you'll realize that I was right
    [A] at one time [B] on time [C] in time [D] at times
13. The inspector of Education who made several trips on the bad returned yesterday completely----- by fever [A] brought down [B] put down [C] worn down [D] worn off
14. The vice principal asked the student to always ---------- their answers only from the textbooks recommended course [A] look out [B] search out [C] look up [D] bring up
15. I know that your friend will not accept the proposal,----------
    [A] and you neither [B] and neither you [C] neither do you [D] neither will you
16. Mark is very handsome fellow who informs me that he has ---------- for pretty girls
    [A] a heart [B] a lip [C] an eye [D] a check
17. Wale Agun, in creating his characters, draws freely ----- his experience in life
    [A] by [B] in [C] on [D] of
18. When I have an appointment with someone, I hate --------- waiting
    [A] to be keeping [B] for being kept [C] being kept [D] in being kept
19. It's no good ---------- about the result until you have sat for the examination
    [A] to worry [B] for worrying [C] worrying [D] to have worried
20. If you don't want to ---------- your car to robbers, then don't travel in the night
    [A] loose [B]loss [C] lose [D] lost

MATHEMATICS

21. The number 25 when converted from the tens and units base to the binary base (base two) is one of the following. [A] 10011 [B] 111011 [C] 111000 [D] 11001 [E] 110011.
22. Evaluate $(6.3 \times 10^5) / (81 \times 10^3)$ to 3 significant figures [A]77.80[B] 778.0[C] 7.870 [D] 8.770 [E] 88.70.
23. The positive root of t in the following equation, $4t^2 + 7t - 1=0$, correct to 4 places of decimal, is [A] 1.0622 [B] 10.6225 [C] 0.1328 [D] 0.3218 [E] 2.0132.
24. The difference between the length and width of a rectangle is 6cm and the area is $135cm^2$. What is the length? [A] 25cm [B] 18cm [C] 15cm [D] 24cm [E] 27cm.
25. The first term of an Arithmetic Progression is 3 and the fifth term is 9. Find the number of the terms in the progression if the sum is 81. [A] 12 [B] 27 [C] 9 [D] 4 [E] 36.
26. The difference between $4\,5/7$ and $2\,1/4$ greater than the sum of $1/14$ and $1\,1/2$ [A] 23/28 [B] 24/28 [C] 50/56 [D] 27/28 [E] 48/56.
27. Multiply $x^2 + x + 1$ by $x^2 - x + 1$. [A] $x^4 + 3x^2 + x + 1$ [B] $x^4 + x^2 + 1$ [C] $x^4 + 4x^2 - 6x + 1$ [D] $x^4 - 6x^2 - 4x + 1$ [E] $x^4 - x - x^3 x^2 + 1$.
28. A baking recipe calls for 2.5 kg of sugar and 4.5 kg flour. With this recipe some cakes were baked using 24.5 kg of a mixture of sugar and flour. How much sugar was used? [A]12.25g [B] 6.5kg [C] 8.75kg [DI 15.75kg [E] 8.25kg.
29. The sum of the root of a quadratic is 5/2 and then product of its root is 4. The quadratic equation is [A] $2x^2 + 5x + 8 = 0$ B] $2x^2 - 5x + 8 = 0$ [C] $2x^2 - 8x + 5 = 0$ [D] $2x^2 + 8x - 5 = 0$ [E] $2x^2 - 5x + 8 = 0 \Rightarrow 2x^2 - 5x - 8 = 0$.
30. Solve the given equation $(\log_3 x)^2 - 6\log_3 x + 9 = 0$ [A] 27 [B] 9 [C] 1/27 [D] 18 [E] 81

CHEMISTRY

31. In which order are the following salts sensitive to light? [A] AgI>AgCl>AgBr [B] AgCl>AgI>AgBr [C] AgBr>AgCl>AgI [D] AgCl>AgBr>AgI.
32. The pOH of a solution of 0.25 mol dm^{-3} of hydrochloric acid is [A] 12.40 [B] 13.40 [C] 14.40 [D] 14.60
33. $MnO^-_{4(aq)} + 8H^+_{(aq)} + Y \rightarrow Mn^{2+}_{(aq)} + 4H_2O_{(l)}$ Y in the equation represents [A] $2\bar{e}$ [B] $3\bar{e}$ [C] $5\,\bar{e}$ [D] $7\bar{e}$
34. Given that M is the mass of substance deposited in an electrolysis and Q the quality consumed, then Faraday's law can be written as [A] Z/Q [B] Q/Z [C] Z/2Q [D] M = QZ.
35. 0.46g of ethanol when burned raised the temperature of 50g of water by 14.3K. Calculate the heat of combustion of ethanol. (A)+33000KJ mol^{-1} [B] +300KJ mol^{-1} [C] – 300KJ mol^{-1} [D]-300KJmol^{-1} {C=12, O=16,H=1,Specific heat capacity of water=4.2Jg^{-1}}
36. Powdered marble reacts faster with hydrochloric acid solution than the granular form because the powdered form has [A] more molecules [B] more atoms [C] larger surface area [D] relatively large mass.
37. For a reaction in equilibrium, the species involved in the equilibrium constant expression are [A] gaseous and solid species [B] liquid and solid species [C] solid and dissolved species [D] gaseous and dissolved species.
38. A phenomenon where an element exists in different forms in the same physical state is known as [A] isomerism [B] amorphism [C] allotropy [D] isotropy.
39. The substance often used for vulcanization of rubber is [A] chlorine [B] hydrogen peroxide [C] sulphur [D] tetraoxosulphate (VI) acid.
40. A gas that is not associated with global warming is [A] CO_2 [B] SO_3 [C] CH_4 [D] H_2

BIOLOGY

41. Which of the following structures is capable of producing more tissues in the stem of a herbaceous flowering plant? [A] Epidermis [B] pericycle [C] xylem [D] cambium.
42. The manufacture of carbohydrates by plants takes place only in [A] the leaves [B] the green stems [C] chlorophyllus parts [D] Flowering plants.
43. In water culture experiment, a plant showed poor growth and yellowing of the leaves. These may be due to deficiency of [A] copper [B] iron [C] magnesium [D] calcium.
44. In million's test, when the reagent is added to a protein food item, a white precipitate is produced which turns [A] blue on heating [B] yellow on heating [C] green on heating D]red on heating.
45. Regulation of blood sugar level takes place in the [A] pancreas [B] ileum [C] liver [D] kidney.

46. Unicellular organisms transport essential nutrients directly to all parts of their bodies by the process of diffusion because they have [A] a large volume to surface area ratio [B] a large surface area to volume ratio [C] their bodies immersed in the nutrients [D] their outer membrane made of cellulose.

47. The heart of the adult frog consists of [A] two auricles and two ventricles [B] one auricle and one ventricle [C] two ventricles and one auricle [D] one ventricle and two auricles.

48. In adult mammalian blood, the cells, which lack nuclei, are the [Al erythrocytes [B] lymphocytes [C] leucocytes [D] phagocytes.

49. Which of the following movements occur during exhalation? [A] the diaphragm and intercostals muscles relax [B] the thoracic cavity increases in volume [C] the diaphragm and intercostal muscles contrast [D]the diaphragm contrast and the intercostals muscles relax.

50. In which of the following groups of animals is the Malphigian tubule found?
[A] Lizards, snakes and frogs [B] crickets, houseflies and grasshoppers
[C] millipedes, centipedes and scorpions [D]earth worms, roundworms, and flatworms.

DETAILED ANSWERS TO FUTO POST UTMESCREENING 2010/2011 EXAM TYPE A

PHYSICS

1. **B**- Rectilinear propagation of light
2. **D** - Height of object = 3cm, image distance = 40cm, object distance = 10cm and Height of image (hi) = ?,
   Recall the relation
   $\frac{\text{Height of image}}{\text{Height of object}} = \frac{\text{image distance}}{\text{object distance}}$
   Therefore, $\frac{hi}{3} = \frac{40}{10}$ $h_i = 4 \times 3 = 12$ cm
3. **A**
4. C
5. **A** - In front of the retina
6. **B** – Green Only
7. **D** - from the given values
   L=20cm = 0.2m, f = 480Hz, V = ?
   For first resonance $\lambda = 4L$;
   Recall: $V=f\lambda$
   $=f \times 4L = 480 \times 4 \times 0.2 = 3834$m/s
8. **E** – recall that $f \alpha \sqrt{T}$, so $\frac{f_1}{f_2} = \frac{\sqrt{T_1}}{\sqrt{T_2}}$
   $f_1 = 250$Hz, $f_2 = 350$Hz, $T_1 = 10$N, $T_2 = ?$
   $\frac{250}{350} = \frac{\sqrt{10}}{\sqrt{T_2}}$; $\frac{25}{49} = \frac{10}{T_2}$
   $T_2 = 490/25 = 19.6$N
9. **C**-earth's magnetic flux is entirely horizontal at a place where the magnetic dip is zero.
10. **B** -Given that E = l.5v, r = 1Ω,
    R = 2.67Ω, I = ?
    Recall that: E = I(r + R)
    So; 1.5 = 1(1 + 2.67) =0.4A

USE OF ENGLISH

11. **A** --------- to obtain
12. **C**---------- in time
13.
14. **C** ----------look up
15. **D** ----------neither will you
16. **C**----------an eye
17. **A**----------by
18. **C**---------- being kept
19. **C**---------- worrying
20. **A**----------loose

MATHEMATICS

21. D -

2	25	
2	12	R 1
2	6	R 0
2	3	R 0
2	1	R 1

OR 1 11001_2

22. $\frac{6.3 \times 10^5}{81 \times 10^3} = \frac{63 \times 10^4}{81 \times 10^3} = 7.780$(3 sig.fig.)
23. C.
    Going by almighty formula;
    where a = 4, b= 7 c = -1
    so; $t = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$
    $= \frac{-7 \pm \sqrt{(7^2 - 4(4)(-1)}}{2(4)} = \frac{-7 \pm 8.05}{8}$
    $= \frac{-7 + 8.05}{8}$ or $\frac{-7 - 8.05}{8}$
    = 0.13125 or 1.88125 = 0.1313 (4 d.p)
24. C
    Taken the length as L and the width as WThe difference will be L - W = 6 .....(1)
    LW = 35.....(2)
    From (1); L = 6 + W .....(3)
    Putting equation (1) into (2) we have
    (6+W)W = 135; → $W^2 + 6W - 135 = 0$
    (W – 9) (W + 15) = 0 Therefore, W =9,
    OR -15 ∴ L = 6+W 6+9 = 15

25. $a = 3$; $T_5 = a+4d = 9$; $3 + 4d = 9$
$4d = 6$; $d = 6/4 = 1.5$
$Sn = n/2\,[2a + (n - 1)d] = 81$
$n[2(3) + (n - 1)1.5] = 81$
$3n^2 + 9n = 162$; $n^2 + 3 - 54 = 0$;
$(n - 6)(n + 9) = 0$:. $n = 6$ or -9

26. Difference: $\frac{33}{7} - \frac{9}{4} = \frac{132 - 63}{28} = \frac{69}{28}$

Sum: $\frac{1}{14} + \frac{3}{2} = \frac{1 + 21}{14} = \frac{11}{7}$

$\frac{69}{28} - \frac{11}{7} = \frac{69 - 44}{28} = \frac{25}{28}$

27. B
$(x^2 + x + 1)(x^2 - x + 1)$
$= x^4 - x^3 + x^2 + x^3 - x^2 + x + x^2 - x + 1$
$= x^4 + x^2 + 1$

28. C
Sugar = 2.5kg, flour = 4.5kg
Sugar + flour = 2.5 + 4.5= 7kg
Sugar used = 2.5/7 x 24.5kg = 8.75kg

29. B
Let the roots be a &b
$a+b = 5/2$.... (1)
$ab = 4$.....(2)
From (1), $2a + 2b = 5$
$a = \frac{5-2b}{2}$..... (3)
Putting (3) into (2)
$\frac{[5 - 2b]}{2} b = 4$
$5b - 2b^2 = 8$; $2b^2 - 5b + 8 = 0$

30. A
$(\log_3 x)^2 - 6\log_3 x + 9 = 0$
let $y = \log_3 xy^2 - 6y + 9 = 0$
Using Almighty formular,
$a = 1, b = -6, c = 9$
$y = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a} = \frac{6 \pm \sqrt{(36 - 36)}}{2}$
$= \frac{6+0}{2}$ or $\frac{6-0}{2}$
$y = 3$ (twice)
but $y = \log_3 x3 = \log_3 x3^3 = x = 27$

CHEMISTRY

31. **D** – AgCl > AgBr > AgI
32. **B** –13.40;
PH = log[1/0H⁻]
= log[1/0.25] ; = log 4 = 0.602;
But PH + POH = 14
POH = 14 – PH = 14 - 0.602 = 13.40
33.
34 **D** – m = ZQ (faraday' law states that M = ZQ)
35.
36. **C**- larger surface area
37. **D** - gaseous and dissolved species.
38. **D** - Allotropy
39. **C**- Sulphur
40. **D** - H_2

BIOLOGY

41. D - Cambium
42. C – Chlorophylluos parts
43. **C** - Magnesium
44. **D** - Red on heating
45. **C** - Liver
46. **B** – a large surface area to volume ratio
47. **C** – two ventricles and one auricle
48. **A** - Erythrocytes
49. D - the diaphragm contracts and intercostals muscles relax
50. **B**-crickets, house flies and grasshoppers

BUILD YOUR CONFIDENCE

Who told you he is better than you?
Who told you that you cannot do it?
Who told you that you must get another person to sit with you to succeed?
Do you know if you are far better than that one you want to giraffe from
Know this that no body can *make you inferior* without your consent. The very moment you begin doubting yourself, you begin *buying doubles* (you know?) then that is the moment your failure begins.

I trust in God, yet you don't prove it by actions.

If you trust in God, why contract your fellowman place your future in his hands. You are the sole architect of your future, God aside, as you set to blaze your path through this next great scene, do so with confidence and courage. You own it. May Jehovah God grant you confidence, courage, understanding and may the questions be in the scope of what you know. May you remember. AMEN.

Don't cross this page without reading this.

FUTO 2009/2010 POST- UME SCREENING

ANSWER ALL QUESTIONS: SHADE THE ANSWER SHEET AS APPROPRIATE WITH HB PENCIL ONLY SAT. 04 JULY, 2009

PHYSICS

1. Which of the following is not an example of a force? (A) Tension (B) weight (C) friction (D) thrust.
2. A body moves along a circular path with uniform angular speed of 0.6 rads^{-1} and at a constant speed 3.0ms. Calculate the acceleration of the body towards the center of the circle
   (A) 25.0 r (B) 5.4ms^{-1} (C) 5.0 s^{-1} (D) 1.8 s^{-1} (E) 0.2ms
3. Which of the following is a derived unit?
   (A) Ampere (B) Kilogramme (C) Sound (D) Ohm (E) Kelvin
4. A boy timed 20 oscillations of a certain pendulum three times and obtained 44.3s, 45.5s and respectively. Calculate the mean period of oscillation of the pendulum
   (A) 0.13s (B) 2.22s (C) 2.26s (D) 44.30s (E) 45.17s.
5. A particle starts from rest and moves with a constant acceleration of 0.5ms^{-2}. Calculate the time take the particle to cover a distance of 25m. (A) 2.5s (B) 7.1s (C) 10.0s (D) 50.0s (E) 100.0s.
6. A block of material of Volume 2 x 10^{-5}m^3 and density 2.5 x 10^{3}kgm^3 is suspended from a spring balance with half the volume of the block immersed in water. What is the reading of the spring balance?
   (Density of water = 1.0 x 103kg-3, g=10ms-2) (A) 0.10N (B)0.25N (C) 0.30N (D) 0.40N (E) 0.50N.
7. An object is projected with a velocity of 100ms^{-1} from the ground level at an angle to the vertical. Total time of flight of the projectile is 10s, calculated (g=10ms^{-1}) (A)0^0 (B)30^0 (C)45^0 (D)60^0 (E)90^0.
8. How far will a body move in 4 second if uniformly accelerated from rest at rate of 2
   (A)32m (B)24m (C)16m (D) 12m (E)8m.
9. If the temperature of water is gradually increased from 0^0 to 4^0 C, the density of the water within this ra
   (A)Increases for a while and then decreases (B) decreases for a while and then increase
   (C)increase gradually (D)decreases gradually (E) remains the same.
10. The expansion of solids can be considered a disadvantage in the
    (A) Fire alarm system (B) thermostat (C) riveting of steel plates
    (D) balance wheel of a watch (E) fitting of wheels on rims.
11. A solid metal cube of side 10cm is heated from 10^{0}c to 60^{0}c. if the liner expansively of the metal is 1.2x10^{5}k^{-1}, calculate the increase in its volume (A)0.6cm^3 (B) 1.2cm^3 (C)1.8cm^3 (D)3.6cm^3 (E) 6.0cm^3.
12. A gas has a volume of 546cm^2 at0^{0}c. What is the volume of the gas at-100^{0}c if its pressure remains constant?
    (A)346cm^3 (B)446cm^3 (C)546cm^3 (D)545cm^3 (E) 745CM^3.
13. An image which cannot be formed on a screen is said to be
    (A) inverted (B) real (C) virtual (D) erect (E) blurred
14. Longitudinal waves cannot be
    (A) diffracted (B) refracted (C) polarized (D) reflected (E) superposed.
15. The image formed by a diverging lens are always . (A) diminished, virtual and in virtual (B) diminished inverted and real (C) diminished, virtual and erect (D) magnified, virtual erect (E) magnified, real and inverted.
16. In the normal use of a simple microscope, a person sees an (A) inverted, virtual and magnified image (B) erect, virtual and magnified image (C) erect, real and magnified image (D) inverted, real and magnified image (E) inverted and real image the same size as the object.
17. A lens of focal length 15.ocm forms an upright images four times the same size of an object. Calculate the distance of the image from the lens (A) 11.3cm (B) 18.8cm (C) 37.5cm (D) 45.0cm (E) 75.0cm
18. An object is placed between two mirrors which are inclined at an angle of 120^0 and facing each other. Determine the number of images observed in two mirrors (A) 1 (B) 2 (C) 3 (D) 4 (E) 5.
19. In a ripple tank experiment, a vibrating plate is used to generate ripples in the water. If the distance between two successive troughs in 3.5cm and the wave travels a distance of 31.5cm, in 1.5s.Calculate the frequency of the vibrator (A) 3.0Hz (B) 6.0Hz (C) 12.0Hz (D) 27.0Hz (E) 73.5Hz.
20. Which of the following have the longest wavelengths?
    (A) Infra-red rays (B) gamma rays (C) x-rays (D) ultra-violent rays (E) radio waves.

MATHEMATICS

21. Simply 125$^{-1/3}$X 49$^{-1/2}$X 10^0 (A) 350 (B) 35 (C) 1/35 (D) 1/350 (E) 0.
22. If 3^{2x} = 27, what is x? (A) 1 (B) 1.5 (C) 4.5 (D) 18 (E) 40.5.
23. Express 0.00562 in standard form (A) 5.62 x 10^{-3} (B) 5.62 x 10^{-2} (C) 5.6^2 x 10^2 (D) 5.62 x 10^3
24. Given that 1/3 Log$_{10}$ P = 1, find the value of P. (A) 1/10 (B) 3 (C) 10 (D) 100 (E) 1000.
25. Simplify: log8/(log8) (A) 1/3 (B) $^1/_2$ (C) 1/3log2 (D)$^1/_2$log2
26. If log x = 2.3675 and log y=0.9750, find x +y, correct to three significant figures?
    (A) 1.18 (B)1.31 (C)9.03 (D)9.44

To succeed you must learn to rise above your fears!

27. While doing his physics practical, I down recorded a reading as 1.12cm instead of 1.21cm. Calculate his percentage error (A) 1.17% (B) 6.38% (C) 7.44% (D) 8.05% (E) 9.00%
28. Find the 4th term of an A.P whose first term is 2 and the common difference is 0.5
(A) 0.5 (B) 2.5 (C) 3.5 (D) 4 (E) 4.5
29. An arc of length 22cm subtends an angels of at the Centre of the circle. What is the value of 0 if the radius of the circle is 15cm? (take =22/7) (A) 70^o (B) 84^o (C) 96^o (D) 156^0 (E) 168^0
30. Find the sum of the first five terms of the GP2, 6, 18. (A) 484 (B) 243 (C) 243 (D) 242 (D) 130 (E) 121
31. Let J be the set of positive integers. If H = (x:x J, X^2<3 and x 0) then,
(A) H {1} (B) H is an infinite set (C) H {0,1,2} (D) H={} (E) J<H.
32. In a class of 80 students, every student had to study economics or Geography, or bother economics and Geography if 65 students studies Economics and 50 studied Geography, how many studied both subjects?
(A) 15 (B) 30 (C) 35 (D) 45 (E) 50.
33. Factorize x^2 +4x -192
(A) (x-4) (x+48) (B) (x-48) (x-4) (C) (x-12 (x+16) (D) (x-12 (x16) (E) (x+12) (x+16).
34. Factors $2e^2$-3e+1 (A) (2e-1) (e-1) (B) (e+1) (2e+1) (C) (2e+3) (3-2) (D) (2e-3) (e-1) (E) (e^2-3) (2e-1)
35. Solve the equation $7y^2$ =3y: (A) y =3or7 (B) y =) of 3/7 (D) y=0 0r 9 (e) y=0 or 10
36. Solve the equation $2a^2$-3a-27=0 (A) 3/2,9 (B)-2/3,9 (C) 3,9/2 (D) -3,-9/2 (E) -3,9/2
37. A sector of a circle of radius 7cm has an area of $44cm^2$. Calculate the angle of the sector, correct to the nearest degree. (A) 6^0 (B) 26^0 (C) 52^0 (D) 103^0 (E) 206^0.
38. If the shadow of a pole 7m high is $^1/_2$ its length, what is the angle of elevation of the sun, correct to nearest degree? (A) 90^0 (B) 63^0 (C) 60^0 (D) 26^0 (E) 0^0.
39. From the top of a building 10m high, the angle of depression of a stone lying on the horizontal ground is 69^0. Calculate, correct to 1 decimal place, the distance of the stone from the foot of the building.
(A) 3.6m (B) 3.8m (C) 6.0m (D) 9.3m (E) 26.1m.
40. The bearing of a point X from Y is 074^0. What is he bearing of Y from X?(A) 106^0 (B)148^0 (C) 164^0 (D) 254^0 (E) 286^0.

BIOLOGY

41. The nucleus is considered the central organelle of a cell because it (A) contains the genetic material (B) contains the nuclear sap (C) is bounded by the nuclear membrane (D) is located at the center of the cell.
42. The prokaryotic cell type is characterized by (A)complex cytoplasm in which different regions are poorly defined (B) localization of different regions of the cell into issues (C) collection of organelles and macromolecular complexes (D) simple cytoplasm with well defined regions.
43. The natural tendency of organisms as they evolves is to
(A) decrease in size (B) increase in number (C) develop specialized structures (D) feed indiscriminately.
44. In snails, the hard calcareous shells are secreted by the
(A) radius (B) tenidium (C) pneumostome (D) mantle.
45. The ability of the cockroach to live in cracks and receives is enhanced by the possession of
(A) wings and segmented body (B) compound eyes (C) claws on the legs (D) dorso-ventrally flattened body.
46. The caste of termites that lacks pigmentation is the (A) king (B) worker (C) soldier (D) queen.
47. The structures that prevent food particles from escaping through the fish gills are called gill
(A) arches (B) filaments (C) rakers (D)lamellae.
48. A distinguishing feature of mammals is the possession of (A) skin (B) scale (C) nail (D) hair.
49. Which of the following structures is capable of producing more tissues in the stem of a herbaceous flowering plant? (A)epidermis (B) pericycle (C) xylem (D) cambium.
50. The manufacture of carbohydrates by plants takes place only in
(A) the leaves (B) the green stems (C) chlorophyllous parts (D) flowering plants.
51. In a water culture experiment a plant showed poor growth and yellowing of the leaves. These may be due to deficiency of (A) copper (B) iron (C) magnesium (D) calcium.
52. In Million's test, when the reagent is added to a protein food item, a white precipitate is produced which turns
(A) blue on heating (B) yellow on heating (C) green on heating (D) red on heating.
53. Regulation of blood sugar level takes place in the (A) pancreas (B) ileum (C) liver (D) kidney.
54. Unicellular or bariums transport essential nutrients directly to all parts of their bodies by the process of diffusion because they have (a) a large volume to surface area ratio (B) a large surface area to volume ratio
(C) their bodies immersed in the nutrients (D) their outer membrane made of cellulose.
55. The heart of the adult blood, the cells which lack nuclear are the
(A) erythrocytes (B) lymphocytes (C) two ventricles and one auricle (D) one vehicle and two auricles.
56. In adult mammalian blood, the cells which lack nuclei are the
(A) erythrocytes (B) lymphocytes (C) leucocytes (D) phagocytes.
57. Which of the following movements occur during exhalation?
(A) The diaphragm and intercostals muscles relax (B) the thoracic cavity increases in volume (C) the diaphragm and intercostals muscles contrast (D) earthworms, roundworms and flatworms.

58. In which of the following groups of animals is the malphigian tubule found?
(A) Lizards, snakes and frogs (B) crickets, houseflies and grasshoppers. (C) Millipedes, centipedes and scorpions (D) earthworms, roundworms, and flatworms.

59. Which of the following is not a function of mammalian skeleton
(A) Protein (B) respiration (C) transportation (D) support

60. The most reliable estimate of growth is by measuring changes in
(A) length (B)volume (C) surface area (D) dry weight.

CHEMISTRY

61. Which of the following is a physical change?
(A) the bubbling of chlorine into water (B) the bubbling of chlorine into a jar containing hydrogen
(C) the dissolution of sodium chloride in water (D) the passing of steam over heated iron.

62. In the reaction $SnO_2 + 2C \rightarrow$ Sn + 2CO the mass of coke containing 80% carbon required to reduce 0.302kg of pure tin oxide is (A) 40kg (B) 0.20kg (C) 0.06kg (D) 0.04kg. (Sn = 119; O=16, C=12)

63. The Avogadro number of 24g of magnesium is the same as that of (A) 1g of hydrogen molecules
(B) 16g of oxygen molecules (C) 12g of carbon molecules (D) 35.5g of chlorine molecules.

64. If gas occupies a container of volume $14cm^3$ at 18^0C and 0.971atm, its volume in cm^3 at S.T.P. is
(A) 133 (B) 146 (C) 266 (D) 292

65. The volume occupied by 1.58g of a gas at S.T.P is $500cm^3$. What is the relative molecular mass of the gas?
(A) 28 (B) 32 (C) 44 (D) 71 (G.M.V. at S.T.P = $22.40dm^3$)

66. Equal volumes of CO2, SO2, NO2, and H2S were released into a room at the sample point and time, which of the following gives the order of diffusion of the gases to the opposite corner of the room?
(A) CO, SO_2, H_2S (B) SO_2, NO_2, H_2S, CO (C) CO, H_2S, SO_2, SO_2, (D) CO, H_2S, SO_2,

67. A basic postulate of the kinetic theory of gases is that the molecule of a gas move in straight lines between Collisions. This implies that (A) Collisions are perfectly elastic (B) forces of repulsion exist
(C) Forces of repulsion and attraction are in equilibrium (D) collisions are inelastic.

68. Which of the following terms indicates the number of bonds that can be formed by an atom?
(A) Oxidation number (B) valence (C) atomic number (D) electronegativity .

69. $x_{(g)} \rightarrow x_{(g)}$ the type of energy involved in the above transformation is
(A) ionization energy (B) sublimation energy (C) lattice energy (D) electronic affinity.

70. Chlorine, consisting of two isotopes of mass number 35 and 37, has an atomic mass of 35.5 the relative abundance of the isotopes of mass number 37 is (A) 20 (B) 25 (C) 50 (D) 75

71. $10.0dm^3$ of air containing H_2S as an impurity was passed through a solution of Pb (NO_3) until all the H_2S had reacted. The precipitate of Pbs was found to weigh 5.02g. According to the equation, Pb $(NO_2)_2$+ H2S PBS+HNO2 the percentage by volume of hydrogen sulphide .
(A) 50.2 (B) 47.0 (C) 4.70 (D) 0.47 (pt = 207,s = 32 GMV at S.T.P = $22.4dm^3$)

72. A blue solid, T, Which weighted 5.0g, was placed on a table. After 8 hours the resulting pink solid was found to weigh 5.5g. It can be inferred that substance
(A) is deliquescent (B) is by hygroscopic (C) has some molecules of water of crystallization (D) is efflorescent.

73. The effluent of an industrial plant used in the electrolysis of concentrated brine, with a flowering mercury cathode may contain impurities like (A) oxygen (B) hydrogen (C) mercury (ii) Chloride (D) hydrogen chloride.

74. The solubility in moles perdm^3 of 20g of $CuSO_4$ dissolved in 100g of water at 18^0C is
(A) 0.13 (B) 0.25 (C) 1.25 (D) 2.00 (Cu = 635:S = 32, O = 16)

75. Smoke consists of (A) solid particle dispersed in liquid (B) solid or liquid particles dispersed in gas (C) gas or liquid particles dispersed in liquid (D) liquid particles dispersed in liquid.

76. $Na_2C_2O_4 + CaCl_2 \rightarrow CaCO_2O_4 + 2NaCl$. Given a solution of sodium oxalate in 50g of water at room temperature, calculate the maximum volume of 0.1 M calcium chloride required to produce maximum calcium oxalate using the above equation (A) $1.40 \times 10^2 cm^3$ (B) $1.40 \times 10^2 cm^3$ (C) $1.40 \times 10^{-2} cm^3$ (D) $1.40 \times 10^{-2} cm^3$

77. 2.0g of monobasic acid was made up to $25cm^3$ with distilled water $25.00cm^3$ of this solution required $20.00cm^3$ of 0.1 M NaOH solution for complete neutralization. The molar mass of the acid is(A) 200g(B) 150g (C) 100g (D) 50g.

78. What is the concentration of H + ions in moles perdm^3 of a solution $1dm^3$ of 0.05M acid?
(A) $4.5cm^3$ (B) $5.65cm^3$ (C) $6.76cm^3$ (D) $7.87cm^{-3}$

79. What volume of 11.0M hydrochloric acid must be diluted to obtain $1dm^3$ of 0.05M acid?
(A) $4.5cm^3$ (B) $5.6cm^3$ (C) $6.76cm^3$ (D) $7.87cm^3$

80. If 10.8g of silver is deposited in a silver coulometer connected in series with a copper coulometer, the volume of oxygen liberated is
(A) $0.56dm^3$ (B) $5.6dm^3$ (C) $11.20dm^3$ (D) $22.40dm^3$ (Ag = 108; Cu = 64: GMV at S.T.P. = $22.40dm^3$)

ENGLISH

Instruction: Choose the word opposite in meaning to the underlined word

81. The young engineer is good at terminating other people's projects but has not been capable of ..... any of his own. (A) Integrating (B) finishing (C) completing (D) initiating (E) organizing.

82. The manager who expected to be given respect was treated with _____

(A) dignity (B) scorn (C) shame (D) cruelty (E) disloyalty.

83. Those who had invitation cards were admitted to the party while those who had none were_____
(A) barred (B) repelled (C) expelled (D) compelled (E) restricted.

84. Nobody expects him to show ..... for his children but he certainly bestows too much affection on them (A) love (B) concern (C) intimacy (D) devotion (E) hatred.

85. The challenger was crude and inexperienced in contrast to the champion who was .....
(A) great (B) exposed (C) celebrated (D) refined (E) strong

From the words lettered A to E, choose the word that completes each of the following sentences.

86. The fishermen threw a stone into the river and this caused a .....
(A) sprinkle (B) sparkle (C) splash (D) spring (E) storm.

87. The play was so interesting that the .....clapped for quite along time at the end.
(A) spectators (B) Watchers (C) congregation (D) people (E) audience.

88. The building ..... because of weak structural foundation.
(A) tumbled (B) succumbed (C) somersaulted (D) collapsed (E) caved.

89. The magazine was ..... by the government for an offensive publication.
(A) prescribed (B) proscribed (C) suspended (D) condemned (E) persecuted.

90. Many people reacted to the brutal murder of the popular journalist strong.
(A) Indignation (B) demonstration (C) mobilization (D) condemnation (E) accusation.

From the words or groups of words lettered A to E below each of the following sentences, choose the word or group of words that is nearest in meaning to the underlined word or group of words as used in the sentence.

91. It takes a great deal of stamina to run the marathon race.
(A) courage (B) determine (C) energy (D) intelligence (E) cleverness.

92. But for the principal actor the play would have been dull.
(A) Important (B) head (C) master (D) famous (E) main

93. An open car has no protection against the elements to run the marathon race.
(A) Weather (B) emergency (C) molecule (D) atoms (E) agreeable.

94. He was reluctant to grant my request.
(A) disposed (B) delighted (C) reticent (D) unwilling (E) atmosphere.

95. The detective was perplexed when the clues in the murder case pointed to at least a dozen different suspects.
(A) Surprised (B) confused (C) excited (D) discouraged (E) disappointed.

96. The military Governor called for a concerted effort in solving the problems of the state.
(A) a dramatic (B) stealing (C) a joint (D) a directed (E) an unfailing.

97. My financial situation is so precarious that very soon I may be insolvent.
(A) borrowing (B) stealing (C) soluble (D) dependent (E) bankrupt.

98. The chairman is of the opinion that accepting the proposal would be inimical to the objectives of the association.
(A) harmful (B) romantic (C) compromising (D) practical (E) helpful.

99. The famous politician was noted for his pragmatic approach to national interest
(A) idealistic (B) romantic (C) Compromising (D) practical (E) inconsistent

100. Kunle is very pessimistic about our chance of success.
(A) sad (B) despondent (C) unconvinced (D) worried (E) concerned.

DETAILED SOLUTIONS TO FUTO 2009/2010 POST UME SCREENING

PHYSICS

1. D - Mass
2. D – $1.8ms^{-1}$
3. Ohm – D
4. The mean period of oscillation $T = \frac{t}{no\ of\ oscillations}$
= where t is mean time. then t = (< 1.3125.512 < .7) =
4.5 17s No of oscillations =20 $T = \frac{15.17s}{20} = 2.2583s$ =
2.26s – – – C
5. $ut - \frac{1}{2}at^2$; at rest $u = 0$ then $S = \frac{1}{2}at^2$
making the subject $t = \sqrt{\frac{2s}{a}} = \sqrt{\frac{2(25)}{0.5}} = \sqrt{\frac{50}{0.5}} = \sqrt{100}$ =10s – C
6. D ..... -0.40N
7. 60^0 – D
8. $s=ut+1\frac{1}{2}at^2$ from rest means $u = 0$
then $s = \frac{1}{2}at^2 = \frac{1}{2}(2)(4^2) = 16m - C$
9. density increase gradually –C
10. Balance wheel of a watch – D
11. C – $1.8cm^3$
12. E - $746cm^3$
13. C – virtual.
14. D- polarized.
15. C- diminished, virtual and erect.
16. D - inverted, real and magnified image
17. D – 45 cm
18. B – 2
19. C - 12.0Hz
20. E - radio wave

MATHEMATICS

21. $125^{-1/3} \times 49^{-1/2} \times 10^0 = \frac{1}{125^{1/3}} \times \frac{1}{49^{1/2}} \times 10^0$
$= \frac{1}{5} \times \frac{1}{7} \times 1 = \frac{1}{35}$ - C
22. $3^{2x} = 27$ and $27 = 3^3$ equating powers
$2x = 3$ and $X = {}^3/_2 = 1.5$ - B
23. A

24. $\frac{1}{3}\log 10P = 1$ thus $\log_{10} p^{1/3} = 1 = \log_{10} 1$;
$p^{1/3} = 10$; $P = 10^3 = 1000$ - E

25. $\frac{Log8^{1/2}}{Log8^1} = \frac{1}{2} \div 1 = \frac{1}{2}$ -B

26. Log X = 2.3675, Log Y = 0.9750;
X+Y = logx X logy = 2.3675 x 0.9750
= 2.3083 = 2.31 (3s.f) - B

27. % error = $\frac{error}{actualvalue} X \frac{100}{1}$;
The actual value = 1.21cm
%error = $\frac{0.09}{1.21}$ X 100 = 44% - C

28. For an AP value of the nth term
Tn =a+(n-1)d; T_4 = 2+(4-1)0.5 =
2+(3)0.5 = 3.5 - C

29. Length of an arc L= $\frac{\theta}{360}$ X $2\pi r$
given L =22 , R =15
L= $\frac{360}{2\pi r} = \frac{360X22}{2X\frac{22}{7}X15} = 84$ - B

30. C – 242

31. J is a set of positive integers. Note that the set of positive integers is also called set of natural numbers
Thus J = {1,2,3.....} but H = {x:xJ,x^2<3 and x≠0} if x^2< 3 then solving x^2 =3 we have x = ±1.73 thus the only positive integer is 1 hence H = (1) - A

32. U=80, E=65, G=50:
(EUG) -U = (65+50) – 80 = 35 - C

33. ***

34. $2e^2$ -3e +1 =$2e^2$-2e-e+1
= ($2e^2$-2e)(e-1) = 2e(e-1)-1(e-1)
= (2e-1)(e-1) - A

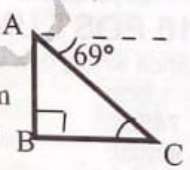
35. $7y^2$ =3y so $7y^2$-3y =0
=y(7y-3) Hence y=0 or y=$\frac{3}{7}$ – C

36. $2a^2$-3a-27 =0 thus x =$\frac{9}{2}$ or x =-3 – E

37. $\frac{\theta}{360} X \pi r^2 = \theta = \frac{360X11}{\frac{22}{7}X7^2} = 102.857^0 = 103$ - D

38. tanθ= 7/3.5 thus θ=63^0 - B

39. Tan69° = $\frac{AB}{BC}$
then BC = $\frac{AB}{tan69}$



BC = $\frac{10}{tan69}$ = 3.0306 = 3 -- B

40. Bearing of Y from X is $180^0 + 74^0 = 254^0$ - D
Note: Bearing is measured from the north in clockwise direction. The bearing is read off from the point where it is said from.

BIOLOGY

41. Contains the genetic materials – A
42. Complex cytoplasm in which different regions are poorly defined. – A
43. Develop specialized structure. – C
44. Mantle – D
45. Dorso-ventrally flattened body. – D
46. Soldier – C
47.
48. Hair- D
49. Cambium – D.
50. chlorophyllus parts –C
51. In his case iron and magnesium are appropriate. Hence B / C
52. Red on heating –D
53. Liver – C
54. A large surface Area to volume ration –B
55. one Ventricle and two auricles –D
56. Erythrocytes –A
57. D
58. crickets, houseflies, grasshoppers –B
59. transportation –C
60 dry weight - D

CHEMISTRY

61. The dissolution of sodium chloride in water –C
62. $0.04kg$ ..... D
63. Atomic mass of magnesium is 24g.
No of molar = $\frac{noofparticles}{avogadrosnumber}$ for 24g of Mg, it contains 1 atom thus the answer is 12g of carbon molecules-C
64. $133cm^5$ - A
65 71g — D
66. - D
67. Collision are perfectly elastic –A
68. Valence –B
69. Ionization energy - A
70. 25 – B
71. 4.7% - C
72. Hygroscopic – B
73. Mercury (II) Chloride –C
74. 1.25 – C
75. Solid or liquid particles dispersed in gas – B
76. Inconclusive
77. $100g$ – – – C
78. PH = $\log_{10}[H^+]$ where $[H^+]$ is concentration of hydrogen ions 4.398 $\log_{10}[H^+]^{-1}$ 4.398
$\text{Log}_{10}[H^+]^{-1}$ - $10^{4.3}$ -250003.45362
$[H^+] = 3.9994 \times 10^{-1} = 4.0 \times 10^5$ -4
79. $4.54cm^3$–A
80. Inconclusive

ENGLISH

81. initiating - D
82. Scorn – B
83. Barred – A
85. Refined – D
86. Splash – C
87. Audience – E
88. Collapsed – D
89. Proscribe – B
90. Condemnation - D
91. Energy – C
92. Main – E
93. Weather – A
94. Unwilling – D
95. Confused – B
96. A joint – C
97. Bankrupt – E
98. Harmful – A
99. Practical – D
100. despondent –B

QUITTERS NEVER WIN

WINNERS NEVER QUIT

PERSEVERE

NEVER QUIT

FUTO 2008/2009POST UME SCREENING

ANSWER ALL QUESTIONS SHADE THE ANSWER SHEET AS APPROPRIATE WITH HB PENCIL ONLY Date 26/7/08 TIME: 1Hr

MATHEMATICS

1. Find the slope of the curve $y=2x^2+5x-3$ at (l, 4) (A)4 (B) (C)79.
2. Determine the maximum value of $y=Sx^2- x^3$ (A) O (B) 2 (C) 4 (D) 6
3. By how much will the mean of **30,56,31,55, 43** and**44** less than the median
   (A) 0.75 (B)0.50 (C) 0.33 (D) 0.17
4. The range of 4.3, 11, 9,6,15 19, 2327, 24,21 and61 is (A) 16 (B)21 (C)23 (D) 24.
5. The mean of the numbers s 3,6,4, X and 7 is 5, Find the standard deviation (A) $\sqrt{2}$ (B) $\sqrt{3}$ (C) 2 (D) 3
6. Find the remainder when $3x^3 + 5x^2 -11x+4$ is divided by x+ 3 . (A) 4 (B) 1 (C) -1 (D) -4
7. What are the integral values of x which satisfy the inequality - l < 3 - 2x = 5?
   (A)2, l,0.-l (B) -1,0,1,2 (C)-1,0,1 (D) 0, 1, 2
8. Find the derivative of (2+ 3x)(1-x) with respect to x. (A) 6x - 1 (B) l-6x (C)6 (D)-3.
9. Find the derivative of the function $y = -2x^2(2x- 1)$ at the point x= -1, (A)-6 (B) -4 (C) 16 (D) 18
10. Find the mean deviation of 1,2,3, and 4, (A) 1.0 (B) 1.5 (C) 2.0 (D)2.5
11. Find the value oft if the standard deviation of2t, 3t 4t, 5t, and 6t is v2. (A)l (B)2 (C) 3 (D) 4
12. In how many ways can 6 coloured chalks be arranged if 2 are of the same colour?
    (A) 50 (B) 120 (C) 240 (D) 360
13. A final examination requires that a student answer 4 out of 6 questions. In how many ways can this be done? (A) 15 (B)20 (C)30 (D)45.
14. If the mean of five consecutive integers is 30, find the Target of the numbers
    (A) 28 (B) 30 (C) 32 (D) 34
15. A bag contains 5 black, 4 white and x red marble if the probability of picking a red marble is 2/5 find the value of x (A)8 (B)10 (C) 4 (D)6.
16. For what value of n is $^{n+1}C_3 = 4(^nC_3)$? (A)6 (B)5 (C)4 (D)31
17. Find the roots of $x^3 - 2X^2- 5x+6 -0$ (A) 1,2, -3 (B) -1, -2,3 (C) -1, -2, -3 (D) 1, -2, 3
18. Find the value of k if the expression $kx^3 +X^2 -5x-2$ 1eavts a remainder when it is divided by 2x+ 1
    (A)10 (B)8 (C)-10 (D) 8
19. Ifyx^2- x-12, fid the range of value of x for which y = 0.
    (A) x<-3 or x<4 (B) x =-3 or x=4 (C) -3 <x =4 (D)-3 = x =4
20. How many terms of the series 3, -6, +12, -24 +... are needed to make a total of 1 -2^8?
    (A) 12 (B) 10 (C)9 (D)8.

PHYSICS

21. The wavelength of the, first overtone of a note in a closed pipe of length 33cm is
    (A) 44cm (B) 33cm (C) 22cm (D) l7cm
22. Non-luminous objects can be seen because they
    (A)are polished (B) are near (C) reflect light (D) emit light
23. The correct unit of energy density is (A) kg $m^{-3}s^{-2}$ (B) kg $m^{-1}S^{-2}$ (C) kg m^3s^{-3} (D) kg m^2s^{-2}
24. The motion of smoke particles from a chimney is typical of
    (A) Oscillatory motion (B) rotational motion (C) circular motion (D) random motion.
25. One of the properties of gamma rays is that they are
    (A) Negatively charged (B) massive (C) neutral (D) positively charge
26. The process whereby the molecules of different, substances move randomly is called
    (A) surface tension (B) diffusion (C) capillarity (D) osmosis
27. The process whereby a liquid turns spontaneously into vapour is ca!!
    (A) Evaporation (B) regelation (C) boiling (D) sublimation
28. The velocity of sound in air will be doubled if its absolute temperature is
    (A) doubled (B) halved (C) constant (D) quadrupled.
29. At thin converging lens has a power of 4.0 diopters determine its focal length
    (A)0.25m (B) 0.03m (C) 5.00m (D) 2.50m
30. An electric device is rated 2000W, 250 V. The correct fuse rating of the device is
    (A) 84A (B) 9A (C) 7A (D) 6A
31. Satellite communication network makes use of
    (A) infra-red rays (B) sound wave (C) visible lights (D) radio wave

32 .If two inductors of inductances 3H and 6H are arranged in series, the total inductance is
(A) 18.0H (B) 9.0H (C) 2.0H (D) 0.5H

33. The current in a reverse-biased junction is due to
(A) Electrons (B) majority carriers (C) holes (D) minority carriers.

34. In an a.c circuit that contains only a capacitor, the voltage lags behind the current by
(A)90° (B) 180° (C) 60° (D) 30°

35. The ray which causes gas molecules to glow is known as
(A) Molecular ray (B) gamma ray (C) anode ray (D)cathode ray

36.The charge carriers in gases are
(A) ions only (B) electrons and titles (C) electrons only (D) electrons and ions

37. Which of the following materials is a conductor? (A) plastic (B) Sodium (C) wax (D) glass

38 The instrument used for securing a large number of similar charges by induction is called
(A) capacitor (B)electrophorus (C) electroscope (D) proof-plane

39.The pitch of a sound note depends on (A) timbre (B) harmonics (C) quality (D) frequency

40. In which of the following material media would sound travel fastest?
(A)water (B) oil, (C)metal (D) gas

BIOLOGY

41. Homologous pairs of chromosomes separate during (A) eytolysis(B) cleavage (C) mitosis (D) meiosis

42. An example of a caryopsis is (A) guava (B) maize grain (C) coconut (D) tomato

43. The response of plants to external stimuli in a non-directional manner is known as
(A) tactic movement (B) phototropism (C) geotropism (D) nastic movement.

44. The most important hormone that induces the ripening of fruit is
(A)ethylene (B) indole acetic acid (C)gibberallin (D) cytokinin.

45. One example of fossil fuels is (A) limestone (B) coral (C) coal (D) firewood

46. The most effective method of dealing with non-biodegradable "pollutants, is by
(A) dumping (B) recycling (C)incineration (D) Burying

47. Mycorrhiza is an association between fungi and
(A) protozons (B) roots of higher plants (C) bacteria (D) filamentous algae.

48. A limiting factor in a plant population near a chemical factory is likely to be
(A) light (B) humidity (C) wind (D) pH.

49. Soil fertility can best be conserved and renewed by the activities of
(A) earthworms (B) man (C) rodents (D) microbes

50. The pioneer organisms in ecological succession are usually the
(A) mosses (B) llohens (C) ferns (D) algae

51. The type of reproduction that leads to variant in animal and plant populations is
(A) budding (B) sexual (C) vegetative (D) asexual

52. An insect with a mandibulate mouth part will obtain its food by
(A) biting and chewing (B) chewing and sucking C) chewing (D) sucking

53. Spines and shells on animals are adaptations of
(A) camouflage (B) chemical defense (C) physical defense (D) mimicry

54. The rods in the retina of the eye are examples of
(A) cells (B) tissues (C) organs (D) Systems

55. A plant-like feature in Euglena is the
(A) pellicle (B) pigment spot (C) large spot (D) gullet

56. The larval stage of a mosquito is called
(A) wriggler (B) grub (C)maggot (D) caterpillar

57. A peculiar characteristic of mammals is that they
(A) have teeth (B) are warm-blooded (C) have lung (D) have ebaceous glands

58. The gall bladder of a mammal has a duct connected to the
(A) liver (B) duodenum (C) small intestine (D) pancreas

59. Rodents gnaw on food with their
(A) molar teeth (B) strong jaws (C) flat-ridged teeth (D) chisel-like front teeth

60. An example of a radically symmetrical organism
(A) planarian (B) hydra (C) tapeworm (D) roundworm

CHEMISTRY

61 The shape of the s-orbital is
(A) spherical (B) Elliptical (C) Spiral (D) Circular

62. Carcinogenic substance is
(A) Asbestos dust (B) Sawdust (C) Nitrogen (II) oxide (D) Carbon (II) oxide.

63. In the electrolysis of brine, the anode, is
(A) Platinum (B) Copper (C) Zinc (D) Carbon

64. Which of the following hydrogen halides has the highest entropy value?
(A) HF (B) HCl (C) HBr (D) HI

65. The allotrope of carbon used in the decolourization of sugar is
(A) Graphite (B) Soot (C) Charcoal (D) Lampblack .

66. Sulphur (IV) oxide bleaches by (A) reduction (B) Oxidation (C) Hydration (D) Adsorption

67. Aluminum hydroxide is used in the dyeing industry as a (A) Salt (B) Dye (C) Mordant (D) Dispersant

68. An Isomer of C_5H_{12} is (A) Butane (B) 2-methylbutane (C)2- methylpropane (D) 2-ethylbutane

69. Vulcanization involves the removal of
(A) A monomer (B) The single bond (C) The double bond (D) A polymer.

70. Phenolphthatein in acidic solution is (A) red (B) orange (C) colourless (D) yellow

71.When iron is exposed to moisture and it rusts the value of ΔG for the reaction is
(A) Neutral (B) zero (C) positive (D) negative

72. A substance that is used as a ripening agent tor fruits is
(A) Ethene (B) Propene (C) Methane (D) Butane

73 The shape of the hydrocarbon compound CH_4 is (A) square planar (B) planar (c)linear (D) tetrahedral,

74 Sugar is separated from as impurities by
(A) preparation (B) crystallization (C) distillation (D) evaporation

75. The component of an atom that contributes least to its mass is the
(A) proton (B) nucleus (C) neutron (D) electron

76. An element will readily form an electrovalent compound if it electron configuration is
(A)2, 8, 1 (B)2,8,4, (C)2,8,8 (D)2,8.5

77. The most suitable metal that can be used as a lightning conductor
(A) Silver (B) copper (C) iron (D) aluminum

78. The most abundant element on the earth's crust is (A) nitrogen (B) hydrogen (C) oxygen (D) fluorine

79. Metalloids are also referred to as (A) semi-metals (B) metals (C) colloids (D) non-metals

80. The ores that can be concentrated by flotation are
(A) nitride ores (B) sulphide ores (C) oxide ores (D) chloride ores

ENGLISH

From the list of words choose the one that best completes each sentence from 81 to 95

81. You are driving --- fast for my liking (A) too (B) very (C) pretty (D) fairly
82. You have given me one orange --- many (A) very (B) so (C) too (D) more
83. The upholstery work doesn't go--- the colour of the car (A) after (B) by (C) with (D) for
84. I became depressed----- hearing the news (A) at (B) with (C) as (D) on
85. He was punished for failing – his duty as a prefect of the school (A) on (B) about (C) with (D) in
86.Good discipline was instructed – the success achieved by the college (A) for (B) to (C) in (D) with
87. It was quite dark in the room—we couldn't see (A) so (B) because (C) through (D) yet
88. He needed work so late – he (A) does (B) needs (C) did (D) need
89. If I had known he would come, I --- have gone to meet him (A) may (B) will (C) should (D) must
90. He ---- thirty when I first met him (A) must have been (B) will have (C) ought to be (D) must have to be
91. Where is that brother of --- now (A) you (B) yours (C) our (D) your
92. Someone told me where it was, but I can't remember---- (A) whom (B) it (C) who (D) didn't
93. I guessed it was going to rain ------? (A) did I (B) was it (C) wasn't it (D) didn't I
94. Would you like the door---? (A) close (B) closes (C) closed (D) closing
95. You shouldn't put off ---the assignment (A) to do (B) to have done (C) having done (D) to have done

Choose the word(s) that is /are nearly opposite in meaning to the underlined word and which correctly fill in the sentence from 96-100

96. The able – bodied should take care of the … (a) feeble (b) weak- minded (c) suffering (d) complete
97. The chairman ordered him either to withdraw to ..... his allegations.
(A) affirm (B) draw (C) express (D) complete
98. He show plenty of <u>good- will</u> to his neighbors, but they bear nothing except .....
(A)bad luck (B)malice (C)anger (D)unhappiness
100. Through many of us were <u>poor</u> quite a few were .....
(A) arrogant (B) prodigal (C) affluent (D) luxurious

DETAILED SOLUTION OF FUTO 2008/2009 POST UTME

MATHEMATICS

1. $y = 2x^2 + 5x - 3, to find slope at (1,4);$

$$slope = \frac{dy}{dx} = \frac{d}{dx}(2x^2 + 5x - 3) = 4x + 5$$

$$then = \frac{dy}{dx} at(1,4) = 4(1) + 5 = 9 - D$$

note (1,4) is (x,y)

2. $y - 3x^2 - x^3$ the polynomial is to degree of three, so it has two turning points. We first of all determine the turning points. At turning points

$$\frac{dy}{dx} = o\ then \frac{d}{dx}(3x^2 - x^3) = 0;$$

$$6x - 3x^2 = 0 \Rightarrow 3x(2 - x) = 0$$

$$thus x = 0 or x = 2$$

We then distinguish the turning points to find the maximum, by taking the second differential

$$\frac{d^2y}{dx^2} = \frac{d}{ds}(6x - 3x^2) = 6 - 6x \quad at\ x = 0$$

$$\frac{d^2y}{dx^2} = 6 - 6(0) = 6 > 0 (minimum point)$$

$$at\ x = 2 \frac{d^2y}{dx^2} = 0 - 6(2) - 6 - 12 = -6 < 0$$

$(maximum point)$ The maximum value of y is at the point where x = 2; substituting it in the equation, we have $y = 3x^2 - x^3$

$$y = 3(2)^2 - (2)^3 = 3(4) - 8 = 4 - C$$

3. $0.33 - C$

4. There is no right option, thus skip.

5. Mean of 3, 6, 4, x, 7,

$$= \frac{\sum x}{n} = \frac{3+5+6+4+x+7}{5}$$

$$\bar{x} = 5 variance = \frac{\sum (x - \bar{x})^2}{n} = \frac{10}{5} = 2$$

$$S.D = \sqrt{variance} = \sqrt{\frac{10}{5}} = \sqrt{2} - A$$

6. We use the remainder theorem

$f(x) = 3x^3 + 5x^2 - 11x + 4$ if x = 3

Leaves a remainder, then f(-3) = remainder R

$f(-3) = 3(-3)^3 + 5(-3)^2 - 11(-3) + 4$

= 81-45+33+4=1- B

7. -1<3-2x≤5?we solve the inequalities differently and then combine them

-1<3-3x >3-2x >-1: 3+1>2x;2x<4;x<2

For the other part 3-3x < 5 >3 ;

5≤2x: 2≤ 2x > 2x ≥ 2 > x≥ 1 thus 1 ≤ x < 2

values in this range are -1,0,1 - - - C

8. Let y =(2+3x)(1-x) we use product rule

$$\frac{dy}{dx} = (2 + 3x)\frac{d(x-1)}{dx} + (1 - x)\ \frac{d}{dx}(2 + 3x)$$

$$= (1 - x)(3) = -2 - 3x + 3 - 3x$$

$$= 1 - 6x - B$$

9. $y = 2x^2(2x-1)$ we can choose to use product rule or we expand. Expanding, we have $y= 4x^3 - 2x^2$ then

$$\frac{dy}{dx} = 12x^2 - 4x\ at\ point\ x = 1 \quad ;$$

$$\frac{dy}{dx} = 12(-1)^2 - 4(-1) = 12 + 4 = 16 - C$$

10. We first of all find the mean;

Mean $\bar{x} = \frac{\sum x}{n} = \frac{1+2+3+4}{4} = \frac{10}{4} = 2.5$

To get mean deviation, we create a table

x	$x - \bar{x}$; $(\bar{x} - 2.5)$	$\lvert x - \bar{x} \rvert$
1	-1.5	1.5
2	-0.5	0.5
3	0.5	0.5
4	1.5	1.5
		4.00

Thus $\sum |x - \bar{x}| = 4.00$;

Mean deviation MD $= \frac{\sum |x - \bar{x}|}{n} = \frac{4}{4} = 1 - A$

11. Standard deviation $= \sqrt{\frac{\sum (x - \bar{x})^2}{n}} = \sqrt{2}$

$$= \sqrt{\frac{10t^2}{5}} => \sqrt{2} = \sqrt{2}t; \quad t = 1 - A$$

12. The arrangement will be $360 - D$

13. This is selection, thus it has to do with combination 15-A

14. Let the first integer be x then the rest are x+1,x+2,x+3,x+4

Their mean

$$\bar{x} = \frac{x + x + 1 + x + 2 + x + 3 + x + 4}{5}$$

$$= \frac{5x + 10}{5} = x = 2$$

But x =30 = x +2 then x =28

largest is x +4 =28+4 = 32 –C

15. Total number of marbles = 5+4+x =9+x

probability of picking a red Marble

$$pr(rod) = \frac{number\ of\ red\ marbles}{total\ number\ of\ marbles}$$

$$= \frac{x}{x+9} = \frac{2}{5} \Rightarrow 5x - 2(x + 9) \Rightarrow 5x - 2x - 18$$

$$\Rightarrow 3x - 18 \ ; x - 6 => X = 6 - D$$

16 $= 4(n_{C_3}) = \frac{(n+1)!}{3+(n+1-3)!} = \frac{(nX1)!}{3!(n-3)!}$

$$cancelling out \frac{(n+1)}{n-2} = 4,$$

$$4(n - 2) = n + 1 \quad => n = 3 - -D$$

17. $x^3 - 2x^2 - 5x + 6 = 0$; =>(x+3)(x-1)(x-3) ;

x= -2,1,3 or to *get the suspected zeros, you check the factors of the constant term that is* $-1, 1, 2, -3$ *thus we try them out. trythat out you will observe the zeroare* 1,-2,3 -D

18. Using the reminder theorem,

$p(x) = kx^3 + x^2 - 5x - 2 = 0$; $p(-½)$
$= k(-½)^3 + (-½)^2 - 5(-½) - 2 = 0$; k = -10 - C

19. X<-3 or x > 4-B ; Note: see textbook for proofs

20. The series is 3,- 6, 12, -24:-the series being a geometrical progression (GP) applying the sum of G.P n= 8 -D

PHYSICS

21. For a closed pipe, first overtone 3fo where f_o is the fundamental frequency of the note. Length of pipe l – 33cm. for first overtone,

22. Reflect light ---- C
Note: Non-luminous objects do not give out light of their own.

23. Energy is in joules = Force X distance = NM But Newton is mass X acceleration = $kgms^2$ Energy density

24. Random motion - D
25. Neutral - C
26. Diffusion - B
27. Evaporation - A
28. We go back to the relationship between velocity and temperature. Where v and T are the velocities and temperatures respectively thus if v is v
29. Power of a lens P = 1/f Where f is the focal length in meters (m) 0.25m – A
30. We calculate the current P = Iv = 1 =
31. Radio waves - D
Note: This is due to the fact that it has the longest wavelength.
32. For inductors in series the total inductance is equal to the sum of the individual inductances. Thus, 3H + 6H = 9H – B
33. Minority carriers – D
34. 90^0 – A
35. Cathode ray - D
Note: cathode rays are electrons.
36. Electrons and ions - D
37. Sodium - B
38. Proof plane – D
39. Frequency - D
40. Metal – C

BIOLOGY

41. Mitosis – C
42. Maize – B
43. Nastic movement - D
44. Ethylene – A
45. Coral - C
46. Recycling – B
47. Roots of higher plants – B
48. pH - D
49. Microbes - D
50. Lichens - B
51. Sexual – B
52. Biting and chewing – A
53. Physical defense – C
54. Cells – A
55. Pigment spot - B
56. Wriggler – A
Note: Maggot is the larva of housefly; Caterpillar is the larva of butterfly and Moth; Grub is the larva of Weevil, Ant, bee and Wasp.
57. are warm blooded - B
58. Liver – A
59. Chisel-like front teeth – D
60. Hydra – B

CHEMISTRY

61. Spherical – A
Note: The P-orbital are dumb-bell in shape.
62. Asbestos dust – A
63. Carbon - D
64. HF – A
65. Charcoal - C
66. Reduction - A
67. Mordant - B
68. 2-Methyl butane – B
69. The double bond – C
70. Colourless - B
71. Negative – D
72. Ethene - A
73. Tetrahedral – D
74. Crystallization B
75. Electron D
76. 2, 8, 1 - A
77. Copper - B
78. Oxygen – C
79. Semi-metals – A
80. Sulphide ores – B

ENGLISH

81. Too – A
82. Very - A
83. With – C
84. on – D
85. in – D
86. in – C
87. so - A
88. Unclear question,
89. will – B
90. Must have been - A
91. Yours - B
92. who – C
93. Didn't i? - D
94. closed - C
95. having done - C
96. Feeble
97. Affirm – A
98. Malice – B
99. Objected to - B
100. Affluent – C

CHALLENGES
ARE WHAT
MAKES LIFE
INTERESTING.
OVERCOMING
THEM
MAKES
LIFE
MEANINGFUL.
THIS
IS
ONE
CHALLENGE
YOU
MUST
OVERCOME.

FUTO SCREENING EXERCISE 2007/2008

ANSWER ALL QUESTIONS TIME ALLOWED: 1 HOUR

Shade the Answer Sheet As Appropriate With HB Pencil Only

PHYSICS

1. The length of a displaced pendulum bob which passes its lowest point twice every second, assuming g = $10ms^2$, is (A)0.25m (B)C.45m (C)C.58m (D)1.00m (E) 1.2m
2. The inner diameter of a small test tube can be measured accurately using a (A) Micrometer screw gauge (B) Pair of dividers (C) Meter rule (D) Pair of vernier calipers. (E) Meter screw
3. An object is projected with a velocity of 50 ms^{-1} at an angle of 30° to the horizontal. The maximum height reached, assuming g = $10m/s^2$is (A) 20m (B)80m (C) 160m (D)32Dm (E) 4Dm
4. A cone in an unstable equilibrium has its potential energy (A) Decreased (B) Increased (C) Oscillating (D) Unchanged (E) Undulating
5. A car of mass 800kg attains a speed of 25ms^{-1} In 20 seconds. The power developed in the engine is (A) 12.5KW (B)25.0KW (C) 1.25MW (D)2.20MW (E)LMW
6. When a ship sails from salt water into fresh water, the fraction of its volume above the water surface will (A) Decreased (B) Remain the same (C) Increase (D) Increase then decrease (E) All of the above
7. A machine gun with a mass of 5kg fires a 50g bullet at a speed of 100ms^{-1}. The record speed of the machine gun is (A) 0.5ms^{-1} (B) 1.5ms^{-1} (C) 1ms^{-1} (D)2m^{s-1} (E)4m^{s-1}
8. Apiece of rubber 10cm long stretches 6mm when a load of 100N is hung from it. What is the strain? (A) $6X10^2$ (B)60 (C)6 (D) 6 (E) $2x10^{-2}$
9. Which of the following does not cause a reduction of the surface tension of water? (A) Soap solution (B) Alcohol (C) Camphor (D) grease (E) Solvent
10. The amount of heat required to raise the temperature of a body is (A) Thermal capacity (B) Thermal energy (C) Specific heat capacity (D) Heat lost (E) Heat gain
11. Water shows anomalous behavior (A) Below 0°C (B) At exactly 4°C (C) Between 4°C and 100°C (D) Between 0"c and 4"C (E) Above 100'C.
12. Which of the following phenomena cannot be explained by the molecular theory of matter? (A) Radiation (B) Conduction (C) Convection (D) Evaporation. (E) Saturation
13. A gas occupies a volume of 300cm3 at a temperature of 27°C. What is its volume at 54°C, when the pressure is constant? (A) 150cm^3 (B) 273cm^3 (C) 327cm^3 (D) 600cm^3 (E) 125cm^3
14. A man clapping his hands at regular intervals observes that the echo of a clap coincides with the next clap. If the reflecting cliff is 160m away and the speed of sound is 320ms^{-1}, what is the frequency of the clapping? (A)2Hz (B)4Hz (C) 8Hz (D) 1Hz (E) 12Hz
15. Which of the following media allow the transmission of sound waves through them: I Air II Liquid III Solid (A) I, II and III (B) I and II only (C) I and III only (D)II and III only (E) III only
16. Which of the following properties is fare common to all waves? I Diffraction II Refraction III Interference (A) I only (B) III only (C) I, II and III (D) II and III only (E) II only
17. Which of the following factors affects the speed of sound in air? I Temperature II Pressure III Frequency (A) II only (B) I and II only (C) I only (D) II and III only (E) III only
18. When white light is dispersed by a spectrometer, the component having the shortest wavelength is (A) Orange (B) Green (C) Red (D) Violet (E) Black
19. Shadows and eclipses result from the (A) Refraction of light (B) Diffraction of light (C) Rectilinear propagation of light (D) Reflection of light (E) Above light
20. The power dissipated in an A.C Circuit with an r.m.s current of 5A, r.ms. voltage of 10V and a phase angle of 60° is (A) 50W (E) 120W (C) 125W (D) 25W (E) 12W
21. Alight of energy 5eV falls on a metal and the electrons with a maximum kinetic energy of 5eV are ejected. The work function of the metals is (A) 0.4Ev (B)7.0ev (C) 2.5ev (D) 3.0eV (E) 1.0ev
22. In semiconductors, the carriers of current at temperature are (A) Electrons only (B) Electrons and holes (C) Holes only (D) Electrons and ions (E) Ions only
23. The temperature at which water Vapour present In the air and begins to condense is known as (A) Boiling point (B) Melting point (C) Dew point (D)Triple point (E) Violet light
24. Which of the following pairs is not part of the electromagnetic spectrum? I Radio waves III Gamma rays IV Alpha rays (A) 1 and II (B) II and IV (C) II and IV (D) I and III (E) All the above
25. A wave of frequency 10Hz forms a stationary wave pattern in a medium where the velocity is20ms^{-1}. The distance between adjacent nodes is (A) 15cm (B) 1.0cm (C) 2.0cm (D) 5.0cm (E) 6.0cm

ENGLISH

A. In each of the following questions choose the options **opposite in meaning** to the underlined word

1. A tentative date was given (A) A definitive (B) A Provisional (C) An amicable (D) Convincing (E) None of the above
2. Obi was the Hero of the story (A) Assassin (B) Villain, (C) Devil (D) Criminate (E) Goliath

3. The man drew a sword as people congregated around him
(A) Fled from (B) Praised (C) Gathered round (D) Mobbed (E) Beat
4. That point you have made is quite apt
(A) Helpful (B) Irrelevant (C) illogical (D) Insensitive (E) All the above
5. That little boy has become quite chubby (A) Intelligent (B) Tall (C)Thin (D)Huge (E) Large
6. The action was premeditated (A) Unplanned (B) Unnecessary (C) Catastrophic (D) Uncoordinated (E) Good
7. The boy made flippant remark (A) A serious (B) A well-meant (C) A correct (D) An expected (E) Yes
8. The weather is getting warmer, so the ice should thaw soon
(A) Frost (B) Freeze (C) Melt (D)Escape (E) Run

B. In each of the following questions, choose the option nearest **in meaning** to the underlined word.

9. She was dressed in a gorgeous costume
(A) Richly colored (B) Loose (C) Badly sewn (D) Tight-fitting (E)Bas Colour
10. Obi's reaction is too subtle to be understood (A) Violent (B)Real (C)Clever (D)Wild (E)Cold
11. Many people are often deceived by superficial knowledge
(A) Cheep (B) Shallow (C) Attractive (D) Penetrating (E) All the above
12. His subjects rejoiced at the end of his tyrannical rule
(A) Cruel (B) Long (C) Just (D) Peaceful (E) Ancient
13. Danquah is a very versatile scholar
(A) Dull (B) Clever at his special field (C) Interested in many different things (D) Stow (E) Lazy
14. Nigerian sailors are very virile
(A) Strong and manly (B) Vindictive ' (C) Virtuous (D) Vicious and cunning (E) Friendly
15. I have to wade through that stream
(A) Walk hurriedly (B) Swain (C) Toddle (D) Walk with difficulty (E) Walk up
16. His rise to fame was meteoric
(A) Well deserved (B) Very gradual (C) Very swift (D) Too slow. (E) All the above
17. Martha came late this morning, but she gave a plausible excuse
(A) Reasonable (B) Very interesting (C) Detailed pathetic (D) Stupid

C. In the following questions choose the expression or word which **best completes** each sentence.

18. The student who went home without an exit has apologize _____his misconduct.
(A) On (B)At (C) About (D)For (E)It
19. The man has atoned_____ his sin's (A) Upon (B)On (C)For (D) At (E) Against
20. 1 am looking _____seeing your family (A) Forward to (B) Ahead at (C) Forward on (D) Ahead to (E) At
21. These folk tales have been landed _____ from generation to generation
(A) In (B) Down (C) inside (D) Across (E) Eat
22. The young lovers first met _____the University of Ibadan Night dancer
(A) In (B)At (C) inside (D) In course of (E)From
23. 1 have not seen my house master_____ the beginning of this session
(A) From (B) In (C) For (D) Since (E) Concerning
24 , Get ___ the untimely death of his son (A) Off (B)By (C) Through (D) Over (E) Eat
25 . If you keep playing with this door handle, it will get_____
(A) Los (B) Loose (C) Lost (D) Loosing (E) Renewed.

MATHEMATICS

1. If $8^{x/2} = 2^{3/8} \times 4^{3/4}$ the value of x is (A) 1 (B) 1¼ (C) 15/8 (D) ¼ (E) ½
2. Without using tables, the numerical value of $\log_7 49 + \log_7 (1/7)$ is (A) 0 (B) -1 (C) +1 (D) ½ (E) 3/17
3. If $x^2 - 6x + n = 0$ has coincident roots, the value of is A9 B. -9 C. 3 D. 4 E. 36
4. The roots of $y^2 - y - 12 = 0$ are A 4,-3 B. -4, 3 C. 4, -3 D. 4, 3 E. None of the above
5. $\sqrt{200} - \sqrt{28}$ is A. $2\sqrt{6}$ B. $\sqrt{72}$ C. $-2\sqrt{2}$ D. $\sqrt{2}$ E. $\sqrt[1]{2}$
6. Simplify $\frac{12}{\sqrt{2}-\sqrt{6}}$ A. $2\sqrt{6}$ B. 2 C. $\sqrt{6}$ D. $12\sqrt{6}$ E. $6\sqrt{6}$
7. In set theory, an empty set is represented with A. Φ B.{} C. {.} D. A and B E. All of the above
8. If A= {xεN: $x^2 - 3x + 2 = 0$}, B= {xεN: x(x-3)=0}, A-B is A.{3} B. (1,2) C. ø D. {2} E. {1, 2, 3}
9. What values of x satisfy the inequality 2x+2<5-x A. x< 1 B. x=l C. x>1 D x =1 E. 0<x=1
10. If the 39th term of an arithmetic progression is 141, what is the first term if the common difference is 2
A.65 B. 141 C.39 D. None of the above E. All of the above.
11. The sum to infinity of the series 1 +½ + ¼ + 1/8 .....is A. 1 B. 2 C. 3 D1/2 E.1/3
12. The value of sin300°is A. $\sqrt{3}/2$ B.1/2 C. -1/2 D.- $\sqrt{3}/2$ E. 1
13. How many sides has a regular polygon whose interior angle is 144? A. 12 B. 9 C. 8 D. 10 E. 11

Use the following data to answer question 14-18 : 6,0,1,2,6,8,2,1,5,1,4,9,6,1,5,6,5,6,8,6,6.

14. The range of the values is A.8 B.9 C. 6 D. 7 E. 5
15. The sum of the numbers and of items are A.85, 20 B. 85, 19 C. 80,200 D. 94,21 E.80. 19

16. The mean value is A. 4.47 B. 4.0 C. 4.25 D..4.05 E 4.21
17. The median of marks is A. 6 B. 5 C.7 D. 8 E. 4
18. The mode the mark is A. 7 B. 6 C. 8 D.5 E. 4
19. Solve $^{7}/_{8}$ of $2\,^{1}/_{4}(2\,^{5}/_{16} - {}^{17}/_{24})$ A. $^{22}/_{27}$ B. $1\,^{5}/_{22}$ C. $\frac{63}{32}$ D. $\frac{48}{34}$ E. $\frac{17}{24}$
20. For what value of x and y are x + y = 2 and 2x-y=7?
A. x=3, y=-I B. x=-3, y=I C. x=-3,y=-I D. x=I, y=3 E. x=I, y=3
21 Simplify $27^{2/3} \times 32^{2/3}$ A. 36 B. 9 C.4 D.1/36 E. None of the above.
22. The equation n^2-16n+ 64 has
A .equal roots B. imaginary roots C. Distinct roots D. No roots E. None of the above.
23. The values of C for which $2c^2$-11ct +12 =0 are A. 4, ½ B. -4, $^{3}/_{2}$ C. 4.-3/2 D.-4, - $^{3}/2$ E. 4,3
24. Which of the following is not a surd .A.$\sqrt{2}$ B. $\sqrt{3}$ C. $\sqrt{24}$ D. $\sqrt{9}$ E. None of the above.
25. Simplify $\frac{4}{\sqrt{5}-1}$ A. √5-1 B. √5+I C. 1-√5 D. 4 0 E. 4/5

CHEMISTRY

1. Which of the following is not a property of magnesium oxide?
A. high melting point B. Dissolution in polar solvent C. presence of ionic bonds D. possession of crystal lattice E. low binding energy.
2. Catalytic hydrogenation of alkenes produces compound general formula
A. $C_nH_{2n+1}OH$ B. C_nH_{2n+1} C. C_nH_{2+2} D. $C_n(H_2O)_y$
3. Tetraoxosulphate (VI) acid is described as strong acid because it is highly
A. corrosive B. Concentrated C. Reactive D. soluble in water E. Ionized in water.
4. Which of these metals, Mg Fe, Pb and Cu will dissolve in dilute HCl if air is blown through the solution?
A. Mg and Fe only B. all the metal C. Mg. Fe, and Cu,, D. Mg, Fe and Pb E. Mg, Pb and Cu.
5. A correct electrochemical series can be obtain from: k, Na, Ca, Al, Mg Zn, Fe, Pb, H, Ag, Au, by interchanging?
A. Zn and Fe, B. Zn and Pb C. Al and Mg D. Au and Ag E. None of the above.
6. Rhombic sulphur, monoclinic sulphur and amorphous sulphur are:
A. Isomers B. Isotopes C. Allotropes D. monomers E. polymorph.
7. Laughing gas is A. Nitrogen (II) oxide B. Nitrogen(I) oxide C. Nitrogen (III) oxide D. Nitrogen (V) oxide E. ammonia
8. The correct name of the Compound CH_3CH_2CONH3Is A. N-methly-propionyl amide B. propionly methyl amide C. methyl Propanamide D. methyl propionlamide E. propionlymethamide
9. The name pentanone is not specific and proper because it can refer to
A . 2-pentanone and 3-pentanone B.I-penatanone and 5-pentanone C. methyl propanone and propyl methanone D. methyl propanone and methyl propyl butanone E. methyl leatanne and Butyipropanone.
10. The oxide that remain unchanged when heated with hydrogen is:
A. C_20, B. Fe_3O_3 C.PbO D.ZnO E. Ag_20
11. What is the most metallic element in the set: A. Na B. Ar C.P D. Al E.Mg
12. What is the mole fraction of water in a soluble prepared by mixing 12.5g of H_20 with 220g of acetone?
A. 0.817 B. 0.845 C.0.183 D.0.155 E.O.205
13. A consequence of global warming is:
A. air pollution B. Water pollution C. increased humidity D. flooding E. little sunshine
14. Gunpowder is made from charcoal, sulphur and potassium trioxonitrate (v) the salt in the mixture perform the function of; A. An oxidant B. a reduction C. a solvent D. acatalyst E. Exploder,
15 . Which one of following group II element has the highest first ionization energy? A. Be B. Mg. C.Ca D. Sr E. Ba
16. In which of the following compound does sulphur have an oxidation number of +4?
A. H_2SO_4 B. H_2S C. SO_2 D. Na_2SO_3 E. $H_2S_2O_7$
17. Which one of the following element does not show allotropy at room temperature and pressure?
A Nitrogen B. Phosphorus C. Oxygen D. carbon E. Sulphur.
18. Cellulose and starch can be classified as one of the following:
A. sugar B. sucrose C. Hydrocarbon D. carbohydrate E. fibers.
19. What mass of anhydrous solution of sodium trioxocarbonate (iv) is required to prepare $250cm^5$ of 0.10m solution? (Na=23, C= 12, 0=15) A. 2.65g B. 0.265g C,10.6g D. 25.5g E.5.26g
20. How many isomers can be formed from organic compounds with molecular formula C_3H_8O? A.2 B. 3 C4D.5 E.6
21 . The oxidation of $CH_3CH_2(CH_2)$ OH gives: A. 2Ibutanal B.2-butanal C. Butane D. Butanoic acid E. Methyl butane
22 .The solubility of alkanols in water due to: A. their ionic character B. their covalent nature C. Ability to from hydrogen bond D. their low boiling points E. their low dielectric constant.
23. The gas that is not associated with global warming is A . CO_2 B. H_2 C. CH_4 D.SO_3 E. None of the above
24. In which order are the following salt sensitive to light:
A. AgBr>Agel>AgI B. Agc>Agl>AgIBr, C. AgI>Agcl>AgBr D. AgCI>AgBr>AgI E. AgBr>AgI>Agcl
25 A phenomenon where an element exist inditferent forms, in the same physical state is known as:
A. Isomerism B. Amorphism C, Isotopy D. Allotropy, E Enantiomerism

DETAILED SOLUTIONS TO FUTO EEE SCREENING 2007/2008

PHYSICS

1. It passes its lowest point twice every second, means that the frequency f = 1hz but T..... for a pendulum, $T - 2n\sqrt{\frac{T}{i}} \Rightarrow T^2 - \frac{Ln^2i}{S}$

$$\Rightarrow T - \frac{T^2}{Ln^2} - \frac{(0.1^*)(IC)}{Ln^2} - 0.253m = 0.25m\,A$$

Note: For a simple pendulum, when the bulb passes its lowest point, it is on the to (motion), on passing through it again, it is the return motion (from) making one oscillation. Thus, in one oscillation, it passes its lowest point twice.

2. Pair of vernier calipers - D
3. For maximum height, $H = \frac{U^2 sin^2\theta}{2g}$

where u= initial velocity = $80ms^{-1}$; $\theta = 30^0$

Then $H = \frac{80^2 (\sin 30)^2}{2X10} = 80mB$

4. Increased - B

Note: A cone in an unstable equilibrium has a high center of gravity. Thus, the PE = mgh is such that PE varies directly as the height if m and g are constant.

5. Power = force x velocity = ma x velocity $= \frac{mv}{t} xv = 800\ x\frac{25}{20}x\ 20 = 2500W = 25KW - B.$
6. Decrease- **A**
7. By law of conservation of linear momentum, the net momentum change is zero.For the gun, its mass M_g = 5kg; its initial velocity u_1 = 0 [at rest). Let the final velocity be V_1.For the bullet, its mass M_b=50g = 50 X 10^{-3} = 0.05kg. Its initial velocity u_2 = 0, and final velocity V_2=$100ms^{-1}$ The gun recoils in the opposite direction to the bullet, thus $M_gV_1 - M_bV_2 = 0$ then $v_1 = \frac{M_bV_2}{M_g} - 0.05\ x\frac{100}{1} - 1mms^{-1}C$
8. $strain = \frac{extension}{orignallenght}; E = 6mm = 0.6cm;$

$$length = 10cm = 100mm;$$

$$strain = \frac{0.6cm}{10cm} = 0.06 = 6.0\ x10^{-2} - A$$

Note: Strain has no unit. The units must harmonize.

9. Grease - **D**
10. Thermal capacity - **A**
11. Between0°Cand4°C – **D**
12. Saturation - **E**
13. At constant pressure, Charles Law holds;

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}\ but V_1 = 300cm^2 T_1 = 27^0C = 27 + 273$$

$$= 300K, T_2 = 54^0C = 54 + 273$$

$$= 327\ then V_2 = \frac{V_1T_2}{T_1} = \frac{300X327}{300} = 327cm^3 - C$$

14. The echo of a clap concise with the next clap. This means that the time interval between one dap and another is equal to the time of the echo. For an echo $v = \frac{2S}{t}$

Where v = velocity of sound = $320ms^{-1}$; = distance travelled The time taken to complete one clap = time between one clap and another: This is the period. – **D**

15. I.II III- -A
16. I, II, III -C
17. I only - C
18. Red -C
19. Rectilinear propagation of light - C
20. Power dissipated = real power P = IVcosθ

I – $I_{r.m.s}$(r.m.s.current) - 5A; V = V_{rms}(r.m.s.voltage) = 10V; θ= phase angle =60^0

$$\rightarrow P = 5(10)\cos 60^0 = 25W - D$$

21. By Einstein's Photoelectric equation,

So, $w = 3evE_K = h_v - w;\ \ E_K = 2ev,$

$$h_v = 5ev,\ \ 2 = 5 - w; -D$$

22. Electrons and holes - **B**
23. Dew point - **C**
24. II and IV-**B**
25. Velocity v= $20ms^{-1}$ and frequency f=10Hz; then from earlier discussions in'2008/2009, the distance between adjacent nodes is half the wavelength. $\frac{L}{2}$Then $\lambda = \frac{v}{f} = \frac{20}{10} = 2$

$$then\frac{2}{2} = 1cm - B$$

Note: There is no need converting since Hz is the same as s^{-1}.

ENGLISH

1. A definitive -A
2. Villain -B
3. Fled from -A
4 Irrelevant- B
5. Thin –C
6. Unplanned –A

7serious-A

8. Freeze- B %

Note: it is important to read instructions aria get the sense of it. Its is also very helpful that you look up the meaning of other words in the option. It wouldn't be a bad idea would it?

9. Richly coloured - A
10. Clever -C
11. Shallow-B
12. Cruel-A
13. Interested in many different things - C
14. Strong and manly-A
15. Walk with difficulty -D
16. Very swift -p
17. Reasonable-A
18. for-D
19. for - C ;
20. forward to-A
21. down -B
22. at-B
23. since D
24. over- D
25. loose -B

Note: It will be very helpful to read up prepositional expressions associated with certain verbs.

Mathematics

1. $8^{x}/_{2} = 2^{3}/_{8} \times 4^{3}/_{4}$ by law of indices we bring them to the same base $\Rightarrow 2^{3x}/_{2} = 2^{3}/_{8} \times 2^{2\,3}/_{4}$ Since they have equal bases, their powers can be equated

$$\frac{3x}{2} = \frac{3}{8} + \frac{6}{4} \Rightarrow \frac{3x}{2} = \frac{15}{8} \Rightarrow 24x = 30$$

$x = {}^{30}/_{24} = {}^{5}/_{4} = 1\,{}^{1}/_{4}$ - B

2. $log_7 49 + log_7({}^{1}/_{7}) = 2log_7 7 - log_7 7$

$\Rightarrow 2 - 1 = 1 - C$

3. x^2- 6x- n =0 has coincident root if it is a perfect square. To get n, we follow the two steps below: evaluate the value of half the coefficient of x and Square the value . Coefficient of x = 6

thus $n = \frac{1}{2} \times -6^2 = (-3)^2 = 9$ – A.

4. y^2-y -12 =0

We look for two values that will multiply to give -12 and add to give -1 (coefficient of y)

thus for y^2-y -12 =0 =>(y-4)(y-3)=0

then y = 4 or -3 - A

5. $\sqrt{200} - \sqrt{128} = \sqrt{100X2} - \sqrt{64X2}$

$=10\sqrt{2} - 8\sqrt{2} = 2\sqrt{2}$ -A

6. $\frac{12}{\sqrt{24}-\sqrt{6}} \Rightarrow \frac{12}{2\sqrt{6}-\sqrt{6}} = \frac{12}{\sqrt{6}} = \frac{12}{\sqrt{6}} X \frac{\sqrt{6}}{\sqrt{6}} \Rightarrow 2\sqrt{6}$ - A

7. A and B - D

8. A ={xϵN:x^2- 3x +2 =0} =>x^2 – 3x +2 =O

A =>{x:1 or 2} B= {xϵN:x (x- 3x) =0} B={ x=O or 3}

A –B = [(1,2) –(0,3)]

A – B = [1, 2] - B

9. 2x + 2 < 5 - x ; 2x + x < 5-2 => 3x < 3 ; x < 1 - A

10. U_{39}=> a +38d ; 141 = a +38(2) ; a = 65. - A

11. $S_n = \frac{a}{1-r} \Rightarrow a = 1, r = {}^{1}/_{2}\; S_n = \frac{1}{1-\frac{1}{2}} \Rightarrow \frac{1}{1/2} = 2$– B

12. $Sin300^0$=> sin (360°- 60°)

=Sin 360°Cos60° – Sin60°Cos360°

$\Rightarrow 0 \times ½ - {}^{\sqrt{3}}/_{2}\, X1 = -{}^{\sqrt{3}}/_{2}$– D

13. Exterior angles +Interior angles =180°;

x +144 =180° ; Exterior angle = 36°;

No of sides (n) = $\frac{360^o}{36^o} = 10 sides$- D

14. range = 9-0 =9 no right option

15. Sum of numbers $\sum x$ = 94 (just add them up) and number of numbers n =21 (by counting) thus

$\sum x, n = 94.21$ – D

16. mean value $\bar{x} = \frac{\sum x}{n} = \frac{94}{21} = 4.47$ – A

17. arranging them in ascending order of magnitude , we have 0,1,1,1,1,2,2,4,5,5,[5,]6,6,6,6,6,6,6,8,8,9 median is 5 -- - B

18. Mode is the number with the highest occurrence = 6 - B

19. ${}^{7}/_{8} \times 2\,{}^{1}/_{4} \div (2\,{}^{5}/_{16} - {}^{17}/_{24}) \Rightarrow \frac{7}{8} X \frac{9}{4} \div \left(\frac{37}{16} - \frac{17}{24}\right)$

$\Rightarrow \frac{7}{8} X \frac{9}{4} X \frac{48}{77} = 1\,{}^{5}/_{22}$ -B

20. x+y = 2..... (1) 2x –y = 7 ..... (2)

$\xrightarrow[x+y=2]{+2x-y=7} \Rightarrow 3x=9 \Rightarrow x = 3$ so; 3 +y = 2 => y= -1

∴ y = -1, x = 3

The secret to success is constancy of purpose.

21. $27^{2}/_{3} \times 32^{2/5}$; $(3^3)^{2/3} \times (2^5)^{2/5} \Rightarrow 3^2 \times 2^2 = 36$ – A

22. n^2 -16n 64 = $(n-8)^2$ it has equal root – A

23. $2c^2$ – 11c +12 using the quadratic formula

$$= \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{(-11) \pm \sqrt{(-11)^2 - 4X2X12}}{2X2}$$

$\Rightarrow C = 4$ or ${}^{3}/_{2}$–

24. $\sqrt{9}$ note the value is an integer =3

25) rationalizing , we multiply by the conjugate $\sqrt{5}$

$$\frac{4}{\sqrt{5}-1} \Rightarrow \frac{4}{\sqrt{5}-1} X \frac{\sqrt{5}+1}{\sqrt{5}+1} \Rightarrow \frac{4(\sqrt{5}+1)}{5-1}$$

$\Rightarrow \frac{4(\sqrt{5}+1)}{4} = \sqrt{5}+1$ - B

CHEMISTRY

1. Low binding energy-**E**
2. C_nH_{2n+2} -C

Note: Catalytic hydrogenation of alkenes produces alkanes by the elimination of the pi bond.

3. Ionized in water –**E**
4. Mg Fe –**A**

Note: these are metals above hydrogen in the activity series

5. Al and Mg –**C**
6. Allotropes - **C**
7. Nitrogen (1) oxide (N_2O) -**B**
8. $CH_3CH_2CONH_2$ The correct name should be propylamide
9. 2 – pentane and 3- pentanone -**A**
10. Ag_2O -**E**
11. Na –**A**
12. 0.155 –**D**
13. Flooding - **D**
14. Exploder -E
15. Be –**A** Note: as we move down the group, first ionization energy decreases.
16. SO_2 – **C**
17. Nitrogen – **A** Note: all those other elements in the option exhibit allotropy, you can read up and identify their various allotropes.
18. Carbohydrates –**D**
19. Let the mass be xg. molar mass of anhydrous sodium troixocabonate (iv)

Na_2CO_3 =2(33) +12+3(16)=46+12+48

=106gmol^{-1} Concentration $= \frac{given mass}{molar mass}$

$$x \frac{1000}{volume\ (cm^3)} \Rightarrow 0.1 = \frac{2}{206} = \frac{130}{230}$$

$$= x \frac{0.1x106}{2} = \frac{10.6}{4} = 2.65$$ -A

20. 3 - **B**
21. 2- butanal –A
22. Ability to form hydrogen bond –**C**
23. CO_2–**A**
24. Ag Cl>AgBr>AgI–**D**
25. allotropy -**D**

In 1969, neil Armstrong made, his way slowly down the ladder of the lunar module of the Apollo 11 space vessel which had been launched weeks ago by the saturn (v) rocket from the florida space station.

Millions of people round the globe heard him say ... "that is one small step for a man, one giant leap for mankind" Take that small step and join it to become a

FUTO SCREENING EXERCISE AAA 2006/2007

ANSWER ALL THE QUESTION TIME: ALLOWED: 1½ HOURS
SHADE THE ANSWER SHEET AS APPROPRIATE WITH HB PENCIL ONLY

PHYSICS

1. Which of the fallowing is used to determine the relative density of the acid in a car battery?
(a) Hypsometer (b) hygrometer (c) manometer (d) hydrometer (e) spectrometer
2. A ball is thrown vertically upwards from the ground with an initial velocity of 50ms^{-1}. What is the total time by the ball in the air? (g = 10ms^{-2}).
A 2.5s (b) 5.0s (c) 10s (d) 15.0s (e) 20.0s
3. If the temperature of a small quality of water in a closed container is gradually increased from 0°C to40°Cthen the density of the water within this range.
(a) Increases for a while and then decreases, (b) decreases for a while and then increases
(c) increases gradually (d) decreases gradually (e) remains the same.
4. An image which can be formed on a screen is said to be
(a) virtual (b) blurred (c) inverted (d) erect (e) real
5. The slope of a straight line displacement-time graph indicates
(a) distance traveled (b) uniform velocity (c) Uniform acceleration (d) instance acceleration
(e) uniform speed.
6. Which of the following is a derived unit?
(A) Meter (b) coulomb (c) kilogram (d) second (e) ampere
7. A ball of mass 0.5kg moving at 10ms^{-1} collides with another ball of equal mass at rest, if the two balls move of together after the impact calculate their common velocity
(a)0.2rn^{-1} (b) 0.5ms^{-1} (c)5.0ms (d) 10.0ms^{-1} (e)20.0ms^{-1}
8. An engine raises 100kg of water through a height of 60m in 20s what is the power of the engine? (g= l0ms^{-1})
(a) 120.00W (b)3000.00W (c)333.00W (d)300.00W (e) 30.00W
9. How much heat is given out when a piece of iron of mass50g and specific heat capacity of 46Ojkg^{-1} k^{-1}.cools from 85°Cto 25°C. (a) 1. 38A 10^{6}J (b) 2.53X10^{3}J (c)7.66x10^{3}J (d) 1.38X 10^{3}J (e) 1.27 x 10^{3}J.
10. A place of cork which is floating on water is acted upon by the force (a) weight and viscosity (b) weight and up thrust (c) up thrust and viscosity (d) weight only (e) up trust only
11. Which of the following is not a suitable method for reducing loss heat from a piece of hot iron?
(a) wrapping it in cotton wool (b) painting black (c) placing it in a vacuum (d) placing it on rubber supports (e) keeping it in a closed wooden box
12. A bat emits is sound at a speed of 1650s and receives the echoes 0. 15s later. Calculate the distance of the bat from the reflector (a) 8.75m (b) 10.50m (c) 87.75m (d) 123,75m (e) 330.00m
13. Which of the following is/are characteristics of sound? I Pitch II loudness III quality IV noise
(a) 1 only (b) II only (c) I and II only (d) I, I and ID only (e) I, II, III and IV
14. A ray of light is incident at an angle of 300 on a glass prism of refractive index 1.5. Calculate the angle through which the ray is minimally deviated in the prism (The medium surrounding the prism is air)
(a)10.5^0 (b)19.5° (c)21.1° (d)38.9^0 (e)40.5°
15. At which of the following distances from the lens should a slide be placed in a slide projector iff is the focal length of the projection lens?
(a) Less than f (b) greater than 2f (c) greater than f but less than 2f (d) equal to f (e) equal to 2f
16. Which of the following correctly gives the relationship between near speed v and angular speed w of a body moving uniformly in a circles of radius? (a) V = wr (b)v = w^{2}r (c)v = wr^2 (d)v^2 =wr (e)v = w/r
17. What part of the camera corresponds to the iris of the eye?
(a) shelter (b) film (c) tens (d) diaphragm (e) focusing ring.
18. Which of the following is not a mechanical wave? (a) wave propagated in a stretched ring
(b) waves in closed pipes (c) radio waves (d) water waves (e) sound waves
19. A catapult used project a stone. Which of the following energy conversions takes place as the stone is released
(a) the kinetic energy of the stone is converted into gravitational potential energy (b) the gravitational potential of the catapult is converted into kinetic energy of the stone, (c) the elastic potential energy of the catapult is converted into kinetic energy of the stone (d) the gravitational potential energy is converted into elastic potential energy (e) the elastic potential energy of the catapult is converted into the gravitational energy of the stone
20. A block of material volume 20cm^3 and density 2.5gm^3 is suspended from a spring balance?
(density of water = gem-^{3}) (a)8g. (b)25g (c)30g (d)40g (e) 50g

MATHEMATICS

21. Factorize the following expression: 2X^2 + X -15. (a) (2x + 5) (x -3) (b) (2x - 5) (X + 3)
(c) (2x - 5) (x - 3) (d) (2x -3) (x + 5) (e) (2X + 5) (X+3)
22. Simplify 36 $^{1/2}$X 1/64$^{1/2}$X 5° (a) ¾ (b) 1/24 (c) 2/3 (d) 1$^1/_2$ (e) 7$^1/_2$

23. Simplify $125^{-1/3} \times 49^{-1/2} \times 10^{0}$ (a)350 (b) 35 (c)l/35 (d) 1/350 (e)0

24 if 3log a +5 log a = log 64, what is a? (a)4 (b) 6 (c) 8 (d)16 (e)32

25. Evaluate $(101.2)^2-(100.5)^2$

(a) 1 (b). 2.02 (c) 20.02 (d) 141.19 (e) 20.20

26. Simplify log6 + log l2

A v4 B.-l C.O D.I E 4

27. Express 0.00562 in standard form (a) 5.62×10^{-3} (b) 5.62×10^{-2} (c) 0.562×10^{-2} (d) 5.62×10^{3}

28. Simplify (log v27)/log81 (a) 1/6 (b) 3/8 (c) ½ (d) ¾

29. If $3^{2x} = 27$ what is x?

A 1/6 B. 1.5 C.4.5 D. 18 E. 405

30. For what value of the expression $(y + 2)1(y^2 - 3y - 10)$ of y is the equation undefined

A. y=0 B. y=2 C. y=3 D. y=5 E. y=10

31. Simplify $\left[\left(\frac{1}{4}\right)^{-1}\right]^{1/2}$

A. $1/6$ B. ¼ C. 2 D. 2 E. 8

32. given that $1/3 \log_{10} P=l$, find the value of p.

A 3 B. 1/10 C. 10 D. 100 E. 1000.

33. Express the product of 0.06 and 0.09 in standard form.

A 5.4×10^{-3} B. 5.4×10^{2} C. 5.4×10^{-1} D. 7.5×10^{-2} E. 7.5×10^{-3}

34. Evaluate 0.009 ÷0.012. Leaving your answer in standard form.

A. 7.4×10^{2} B. 7.5×10^{-1} C. 7.5×10^{-2} D. 7.5×10^{-3} C.2 D. 2 E. 8

35. Solve the equation $3a + 1 0 = a^2$

(a)a = 5ora=2 (b)a = -5ora=2 (c)a=10ora=0 (d)a=5ora=-2 (e) a=-5or a=-2

36. The population of a village is 5846. Express this number to three significant figures.

(a) 5850 (b) 584 (c) 5840 (d) 585 (e) 584

37. If cos 60° = ½ which of the following angles has a cosine of $^1/_2$?

(a) 30° (b) 120° (c) 1500 (d) 2100 (d) 330°

38. Factorize $35 - 2b - b^2$

(a) (35 -2b)(b -1) b. (7+ b) (5 - b) c. (3 + 7b) (5-b) d. (35-b) (3b + 7) e. (7 +b) (5 + b)

39. A ladder 9m long, leans against a vertical wall making an angle of 64° with the horizontal ground. Calculate, correct one decimal place, how far the foot of the ladder is from the wall.

(a)4.0m (b)0.8m (c)7.1m (d) 8.1m (e) 18.5m

40. If the second fourth terms of a geometrical progression are 8 and 32 respectively, what is the sum of the first four terms? (a)28 (b) 40 (c) 48 (d)60 (e)68

CHEMISTRY

41. In which of the following is the" oxidation number of nitrogen zero?

(a) NH_3 (b) $NaNO_3$ (c) HNO_2 (d) N_2 (e) NCL_3

42. Which of the following elements fed form more than one acidic oxide

(a) hydrogen (b) sulphur (c) carbon (d) aluminum (e) iron

43. When air is passed through a heated tube containing finely divided copper, the component that is absorbed in the process is

(a) carbon (iv) oxide (b) nitrogen (c) water vapour (d) noble gases (e) oxygen

44. Which of the following compounds will undergo addition reactions?

(a) ethyne (b) butane (c) pentane (d) tetrachoromethane (e) ethanol

45. Equilibrium is said to be attained in reversible reaction when (a) all the reactants have been used up (b) all the products have been formed , (c) there is no further change in temperature (d) the rates of the forward and backward reactions are equal (e) the rate of the products decreases with time.

46. Catalytic hydrogenation of oils results in the production of

(a) soaps (b)detergents (c) alkanes (d) butter (e) margarine

47. The heal accompanying in the reaction represented by the equation $H2_{(l)}$ $H2O_{(g)} \rightarrow$ is described as the heat of

(a) solution (b)neutralization (c) vaporization (d) sublimation (e) activation

48. The following are use of sulphur except

(a) manufacture of tetroaxosuphatehate (b)prevention of the growth of fungi (c) vulcanization of rubber (d) manufacture of dyes (e) coasting of steel to prevent rust

49. How many molecules are there in 14g of nitrogen gas at S.T.P?(N=14,Avogadro Number = 6.0×10^{23} mo^{-1})

(a) 1.2×10 (b) 3.0×10^{23} (c) 6.0×10^{23} (d) 1.2×10^{24} (e) 3.0×10^{23}

50. The metal extracted from cassiterile is (a) calcium (b) copper (c) tin (d) sodium (e) lead

51. The most suitable method to use when separating an insoluble solid from a liquid is

(a) Evaporation (b) filtration (c) magneti2ation (d) sublimation, (e) distillation

52. What is the amount (in mole) of sodium trioxocarbonate(iv) in5.3gofthe compound? ($Na2CO_3$ = 106)

(a) 0.05 (b) 0.10 (c) 020 (d) 0.50 (e) 2.00

53. 120cm^3 of hydrogen were sparked with 60cm^3 of oxygen at 110°C. what was the volume of steam produced? The equation for the reaction is $2H_2O$ (g) + O_2(g) ⟶ $2H_2O$(g) (a) 30cm^3(b) 60cm^3(c) 90cm^3 d) 120cm^3 (e) 180cm^3
54. The following are miscible with water except (a) ethylethanoate (b) methanol (c) ethanoic acid(d) ethanol
55. The major raw material in a plastic industry is
(a) ethanol (b) sulphur (c) methylethanoate (d) ethane (e) ethane
56. Which of the following compounds is aromatic.
(a) benzene (b) cycbbutane (c) cyclopentane (d) hexane (e) ethane
57. Given that 32 .0g of sulphur contains 6.02x10^{23} sulphur atoms, how many atoms are therein 2.7ogaluminum? (Al=27, S=32) (a)6.02x 10^{23} (b) 3.01 x 10^{23} (c)6.02x 10^{22} (d)5.08x!0^{22} (e)3.01 xl0^{22}
58. An acid present the proteins is
(a) lactic acid (b) amino acid (c) propanoic acid (d) palmitic acid (e) stearic acid
59. A sample of orange juice is suspected to have been .contaminated with a yellow dye. Which of the following methods can be used to detect the dye?
(a) decantation (b) chromatography (c) distillation (d) filtration (e) evaporation
60. Which of the following hydrocarbons is not likely to be present in petrol
(a) $C_{14}H_{30}$ (b) $C_{10}H_{22}$ (c) C_9H_{22} (d) C_7H_{10} (e) C_6H_{12}

ENGLISH

In each of the following sentences, there is one word underlined and one gap. From the list of words lettered A to E, choose the word or group of words that is most nearly opposite in meaning to the underlined word and that will, at the same time, correctly fill the gap in the sentences.

61. People who are normally.....often turn to be dauntless heroes in the face of real danger
(a) Unsteadily (b) colorless (c)cowardly (d) bashful (e) unfriendly
62. It is quite customary to introduce the guest speaker but .....to insult him
(a) Illegal (b) impolite (c) usually (d) useless (e) pointless
63. In these argument, Ade was my supporter even though he is often my .....in other matters
(a) Opponent (b) ally (c) opposite (d) propose (e) deposer
64.1 encouraged my younger brother to take on law as a profession while I..... my sister from doing so
(a) Financed (b) warned (c) dissuaded (d) persuaded (e) helped
65. Tunde purchased various articles at the big sale near Ojota and, surprisingly enough, he .....then all before the replied home that day (a) destroyed (b) bought (c) sold (d) distributed (e) lent
66. Olu was able to kindle the zeal which my father l..... later (a) kill (b) switch (C) destroy (d) extinguish(e) Ignite

Choose the word opposite in meaning to the underlined word

67. His outspokenness contrast with the .....of the father
(a) humour (b) sobriety (c)deafness (d) dumbness (e) taciturnity
68. It is curious how Bayi can be so carefree h his ways when his brother is so.....
(a) meticulous (b) eccentric (c) easy-going (d) lovable (e) indifferent
69. The crops the farmer planted were .....by some naughty boys
(a) sowed (b) weeded (c) destroyed (d) cultivated (e) uprooted
70. Personally, I give-in rather easily when it conies to arguments but Emeka will always .....to his opinions
(a) hold in (b) give out (c) gave out (d) hold off (e) holdback
71. The man refused to accept the offer of a job in the rural areas he preferred one in the..... area
(a) local (b) urban (c) municipal (d) township (e) zonal
72. One of the armed robbers was as daring in his words at the stake as the other was.....
(a) morose (b) secretive (c) reckless (d) timid (e) rational
73. He intentionally threw the documents away and some body..... burnt them
(a) carelessly (b) willingly (c) accidentally (d) foolishly (e) fortunately
74. A gull, which is a natural phenomenon, could not be mistaken for a tunnel which is .....
(a) supernatural (b) false (c) artificial (d) imitative (e) modern

From the words lettered A to K, choose the word that best completes each of the follo[illegible]

75. The governor frowned at the .....which sowed down the implementation of policy[illegible]
(a) Bureaucracy (b) autocracy (c) opposition (d) convention (e)[illegible]
76. The magazine was..... by the government for an offensive publication
(a)prescribed (b) proscribed (c) suspended (d) condemned (e)[illegible]
77. Thefishermanthrewa stone into the river and his caused a .....
(a) sprinkle (b) sparkle (c) splash (d) spring (e) storm
78. Many people reached to the brutal murder of the popular journalist with strong.....
(a) denomination (b) indignation (c) mobilization (d) condemnation (e) accusation
79. The building .....Because of weak structural foundation
(a) tumbled (b) succumbed (c) somersaulted d) collapsed (e)caved
80. The play was so interesting that the ..... -clapped for quite a fang time at the end
(a) Spectator (b) watchers (c) congregation (d) people (e) audience..

DETAILED SOLUTIONS TO 2006/2007 FUTO POST-UME SCREENING

PHYSICS

1. D –hydrometer
2. Total time is equal to time of flight T; $T = \frac{2u \sin}{g}\theta$

Since it is thrown vertically upwards $\theta = 90°$ $T = \frac{2u}{g} = \frac{2(50)}{10}$ = 10ms - C

3. C - Increases gradually
4. E- Real Note: The converse is a virtual image
5. B- uniform velocity
6. B - Coulombs Q = It
7. This is an inelastic collision

$m_1u_1 + m_2u_1 = (m_1 + m_2)V$

$V = \frac{m_1u_1 + m_2u_2}{m_1 + m_2} = \frac{0.5(10)+0.5(0)}{0.5+0.5}$

Note: u_2 is equal to zero, because the other mass is at rest.

8. Power $= \frac{Energy}{Time} = \frac{mgh}{t} = \frac{100 \times 60 \times 10}{20}$ = 3000W - B
9. Heat Q = $mc\theta = \frac{50kg \times 460jkg^{-1}k^{-1} \times (85-25)}{1000}$

= 1380J = 1.38×10^3J - D

10. Weight and upthrust-B
11. Wrapping it in cotton wool -A
12. Let distance be S;

$S = \frac{Vt}{2} = \frac{1650 \times 0.15}{2}$ = 23.75m – D

13. I, II and III only –D
14. Let angle of minimal deviation be D_m.Refractive index

$n = \frac{\sin (A + dm)/2}{\text{Sin } ½ A}$

A is refracting angle = 600

$1.5 = \frac{\sin(60+dm)/2}{0.5}$

$\text{Sin}\left(\frac{60 + dm}{2}\right) = 0.75$

$dm = 2\sin^{-1}(0.75) - 60 = 10.5°$ - A

15. A slide projector should give a magnified, erect and virtual image the position for this is between F and C where C is the optical Centre. Thus less than f -- A
16. V= wr-A
17. The iris of the eye controls the amount of Light entering the eye. In the camera, This is done by diaphragm-D
18. Radio-C
19. The elastic potential energy of the catapult is converted into kinetic energy of the stone –C
20. D. The mass of lie block when it is suspended m = volume x density

$M = 20cm^3 \times 2.5g/cm^3$ M = 50g.

Also, when block when immersed in water and the volume is half, then we have $M_2 = {}^1/_2$(volume) x Density (1)

$M_2 = {}^1/_2 x20 \times 1 = 10g$. Therefore, the reading in the spring is 50g-10g = 40g - - D

MATHEMATICS

21. $2x^2 + + x - 15 = 2x^2 + 6x - 5x - 15$

$(2x^2+6)-(5x+15)$

$2x(x+3)-5(x+3)-5(x+3)$

$= (2x-5)(x+3)$ -B 22. ¾ C

23. $125^{1/3} \times 49^{-1/2} \times 10^0$

$= \frac{1}{125^{1/3}} x \frac{1x1}{49^{1/2}} = \frac{1}{5} x \frac{1}{7} = \frac{1}{35}$ C

24. 3loga +51oga-61oga = log64

Then $\frac{\log a^3 \times a^5}{96} = \log 64$

$a^2 = 64$; a = 8-C

25. $(101.2)^2 - (100.5)^2$

We apply difference of two squares

=[101.2 + 100.5) [101.2 - 100.5)

= (201.7) (0.7) = 141.19 - D

26.Log6 + log2-log l2 = log(6x2)-log12 = log!2- log 12=0 -C

27. $\frac{0.00562x1000}{1000} = 5.62 \times 10^{-3}$ -A

28. $\frac{log27}{\log 81} = \frac{\log (27)^{1/2}}{\log 81} = \frac{\log (3^3)^1/_2}{log3^4}$

$= \frac{\frac{x}{7}log9}{4\log 3} = \frac{1}{2} x \frac{1}{4} = \frac{3}{8}$ - B

29. $3^{2x} = 27 = 3^{2x} = 3^3$

Equating the bases, we have,

2x=3; x=3/2=1.5-B

30. $\frac{y+2}{y^2-3y-10}$ for it to be undefined,

y^2-3y-10; (y-5) (y+2) = 0

Thus y = 5 or y = -2; y =5 --- – D

31. $\left[\left(\frac{1}{4}\right)^{-1}\right]^{½} = 4^{½} = (2^2)^{½} = 2$ ---C

32. 1/3 $\log_{10}$ P = 1; then $\log_{10}$ P+1/3=1; $P^{1/3} = 10^1 = P^{1/3} = 10$

$P = (10)^3 = 1000$ -E

33. 0.06 x0.09 =0.0054 $= 5.4 \times 10^{-3}$ - A

34. $\frac{0.009}{0.012} = \frac{9}{12} = \frac{3}{4} = 0.75$

$= 0.75 = 7.5x10^{-1} - C$

35. $3a+10=a^2$

$= a^2-3a-10 = 0$;

(a-5)(a+2)=0; =a=-2 or 5

36. 5846 ~ 5850(to 3s.f)
37. Cos 60^0 = ½ [1st quadrant]
38. 35 -26 $-b^2$: (9+b) (5-b) -B
39. Cos 64 - $\frac{d}{9}$: d-9cos 64:

$d - 3.94m = 4.0m$ – A 40. D

CHEMISTRY

41. D - N2
42. B - Sulphur
43. E - Oxygen
44. A - ethyne
45. D- threats of the forward and backward reaction are equal
46. E - Margarine
47. C - Vaporization
48. E - coasting of steel to prevent rust
49. A t STP, 28g of N_2= 6.02×10^{23}

∴ 14g of $N_2 \longrightarrow ? \longrightarrow \frac{12 \times 6.02 \times 10^{23}}{28}$

= 3 x10 -B

50. C- tin
51. B -filtration
52. Mole -A
53. $2H_2 + 0_2 \rightarrow 2H_20_2$

Ration 2 :1:2

The volume of steam is $120cm^3$ - D

54. A - ethylethanoate
55. D - ethane
56. A -benzene
57. 27gof Al = 6.02×10^{23}

2.7g of Al =? $\longrightarrow \frac{2.7 \times 6.02\ 10^{23}}{27}$

6.02×10^{23} -C

58. B- aminoacid
59. B - chromatography 60. D-C_7H_{10}

ENGLISH

(61) C – cowardly (62) C-unusual
(63) A –opponent (64) C - dissuades
(65) C – sold (66) D - extinguish
(67) E – Taciturnity
(68) A - meticulous
(69) E - uprooted
(70) E-hold back
(71) B-urban (72) D - timid
(73) C – accidentally (74) C - artificial
(75) A –bureaucracy
(76) B-proscribed
(77) B – splash (78) B-indignation
(79) E – caved (80) E-audience

2005/2006 FUTO ADMISSIONS SELECTION TEST

ENGLISH LANGUAGE TIME: 1hr Answer all Questions

Choose the word phrase from A to E which has the same meaning as the underlined word or words in each sentence.

1. After the wife had covered her misdeeds by prevaricating on several occasions the poor husband accused her point-blank of adultery.
   (a) bluntly (b) pointedly (c) emphatically (d) unreservedly (e) un-mistakingly
2. When a man is immune to an illness. he is
   (a) opposed to it (b) attached to it (c) hasted by it (d) protected against (e) addicted to it
3. In a civilized society, it is unseemly to emit a loud belch at the end of a meal
   (a) noisy (b) annoying (c) stupid (d) outrageous (e) impolite.

Choose appropriate option to fill the gap in the following sentence

4. The principal able to establish a functional language laboratory for his school because he acted_____ the advice of experts on the subject (a) through (b) at (c) from (d) on (e) by
5. The prefect came to the class five minxes after the lesson ___
   (a) has started (b)had started (c) have started (d) is started (e) has been started.
6. Grace must be allergic ___ smoke because any time she sits by someone who is stinking she sneezes
   (a)to (b) from (c) for (d) with (e) by

*Insert the word(s)that best fit(s) in the **meaning** of the sentence.*

7. Legislators must be trained to _____ the truth
   (a) disguise (b) discern (c) digest (d) disturb (c) distort
8. As it holds true that, unless you trained your body you cannot bean athlete, so also unless you train your____ you cannot be a_____ (a) kicking-footballer (b)voice-choirmaster (c) mind- scholar
   (d) courage-hero (e) arms-swimmer.
9. Never in the history of human conflict has so much been owed by so many to so few
   (a) many people owed much money of the end of the war (b) A handful of people saved the lives of a nation
   (c)A few people did a lot of things gratis (d) This conflict caused the largest ransom ever demanded (e) Very little was owed by anyone to anybody.

Choose the option nearest in meaning to the underlined.

10 The salesman tried to pull die wool over my eyes
   (a) force me to buy his goods (b) offer me cotton wool (c) make me buy his wool (d) dupe me
   (e) cover my eyes with wool.
11 The legislator has decided to play second fiddle after he had been walked out of the Assembly violating basic procedures of the house. This means that the legislator has decided to
   (a) oppose every motion in the house (b) support every motion in the house
   (c) condemn every motion (d) support the lead given by others (e) become active in the house
12 Select the wrongly spell word
   (a) disappointed (b) embarrassed (c) equipped (d) rhythm (e) restaurant
13 Select the wrongly spell word
   (a) quite (b) believe (c) proceed (d) precede (e) opportunity

Fill in the right word/phrase

14 He __ the book to the library last week.
   (a) has returned (b) had returned (c) was returned (d) returned (e) was to be returning.
15 the police man was sent to ____ the allegation made by the man
   (a) investing (b) examine (c) problem (d) enquire (e) observe

Which of the options express the same ideas as the one in quote

16 To beat down the 'price" is to
   (a) flog the price (b) reduce the price (c) beat the salesman (d) attack the seller (d) control the price.

Fill the blank spaces in the following sentences matting use of the best of the five options

17 For their part of in the successful ____ the mutineers were count-martial led
   (a) coopes (b) coupes (c) coupe (d) coup (e) coupes
18 The way to stop some frivolous publications is to ____the press
   (a) pag (b) shackle (c) filter (d) handcuff (d) blind

Choose the option opposite in meaning to the word underlined

19. T o most people last Christmas was an austere period
   (a) prosperous (b) harsh (c) severe (d) four (e) stem
20. Chidi is naturally tacitum
   (a) friendly (b) cheerful (c) dumb (d) lively (e) garrulous

CHEMISTRY

21 When air. which contains the gases: oxygen, nitrogen, carbon dioxide, water vapour and the rare gases, is passed through alkaline pyrogallol and then over quicklime, the only gases left are
(a) nitrogen and carbon dioxide (b) the rare gases (c) nitrogen and oxygen
(d) nitrogen and the rare gases (e) nitrogen, carbon dioxide and the rare gases.

22. When large hydrocarbon molecules are heated at high temperature in the presence of a catalyst to give smaller molecules, the process is known as (a) disintegration (b) polymerization (c) cracking
(d) degradation (e) distillation

24 The pH of four solutions W,X,Y,Z are 4,6,8,10, respectively, therefore (a) none of the solutions is acidic (b)the pH of Y is made more acidic by addition of distilled water (c) Z is the most acidic solution (d) W is the most acidic solution (e) X is neutral

25 when each of the nitrated of potassium, magnesium and iron is heated (a) all the nitrates decompose to their oxides (b) the nitrated of magnesium gives the nitrite and oxygen (c) the nitrate of magnesium and iron give the oxides (c) the nitrate of iron gives the nitrite and oxygen (e) the nitrate of magnesium is not decomposed

26 Which of the following contains two amphoteric oxides? (a) sodium oxide, zinc, oxide magnesium
(b) aluminum oxide, calcium oxide, zinc oxide (c) potassium oxide, lithium oxide, carbon dioxide
(d) silver oxide. Lead oxide, sodium oxide (e) sulphur dioxide, aluminum oxide, carbon monoxide

27. Helium atoms are chemically uncreative because
(a) there are no electrons around the nucleus (b) the number of protons equal the number electrons (c) there are equal number of protons and neutrons in the .nucleus (d) the outer electron shell is completely filled (e) the atoms contain only protons

28. $50cm^3$ of hydrogen are sparked with $20cm^3$ of oxygen at 100°Cand 1 atmosphere. The total volume of the residual gases is (a) $50cm^3$ (b) $10cm^3$ (c) $40cm^3$ (d) $30cm^3$ (e) $70cm^3$

29. How many grams of HBr would exactly be required to react with 2g of propyne? (C = 12. H = 1. Br = 80)
(a)4.1g (b)6.lg (c)8.lg (d) l0.g (e) 16.2g

30. When ammonium, potassium and calcium carbonates are each separately heated
(a) non of them will decompose (b) each of them will decompose to give carbon dioxide and the respective oxide (c) ammonium carbonate and potassium carbonate will not compose (d) only ammonium carbonate and calcium carbonate will decompose to carbon dioxide and the respective oxide
(e) ammonium carbonate will decompose -to give carbon dioxide water and ammonia

31 Under high pressure, real gases do not obey gas laws because their molecules
(a) have become more energetic (b) have become less energetic (c) have become smaller in size (d) decompose into atoms (c) start repelling each other.

32. $500cm^3$ oxygen was collected over water 30°C and 752mmHg pressure. What is the volume of dry oxygen at STP (Vapour pressure of water al 30^0Cf = 32mmHg)
(a) 475 cm3 (b)415cm3 (c) 586 cm3 (d) 500cm3 (e)427cm3

33. Which of the following statement; is an exception in the assumptions of the kinetic theory of gases?
(a) gases are composed of many elastic particles (b) the particles are of negligible size (c) the particles arc in constant random motion (d) the particles are of negligible mass (e) the particles collide with each other

34. Which of the following statements is true? (a) metals conduct electricity while non-metals do not (b) metals have high density nonmetals have low density (c) metals form basic non- metals form below oxides (d) in the electro chemical series, metals are above hydrogen while non-metals are below hydrogen
(e) metals lose electrons while non-metal gain electrons during normal reactions

35. 5.00g of hydrated salt of barium when heated to a constant weight gave 4.26g of anhydrous salt with a molecular weight of 208. The number if molecules of water of crystallization in the hydrated salt is
(a) 10 (b)7 (c) 5 (d) 2 (e) 1

36. In the reaction of oxygen with hydrogen to produce water, which of the to following statement is true.
(a) One atom of hydrogen reacts with two atoms of oxygen to give one molecule of water (b) two atoms of hydrogen react with two atoms of oxygen to give two molecule of water (c) one molecule of oxygen react with one molecule of hydrogen to give two molecules of water (d) one molecule of hydrogen reacts with two molecules of oxygen to give three molecule one molecule of water (e) one molecule of oxygen reacts with two. Molecules of hydrogen to give two molecules of water.

37. Oxidation is the process of (a) gain of electrons (b) loss of electrons (c) gain of hydrogen (d) loss of oxygen
(e) addition of an electro positive element to substance

38. the number of atoms in one mole of a substance is equal to (a) the atomic number (b) the Avogadro number
(c) the gas constant (d) the number of (e) the number of electrons

39. Which of the following statement is NOT true of electrovalent compounds? (a) They are solids (b) they do not vaporize easily (c) the elements forming the compound normally have their valency electrons in a shared state (d) they conduct electricity.

40. If concentrated sulphuric acid is added to sugar and warmed gently. The sugar changes from white to brown and finally to a black mass of carbon. In this reaction, concentrated sulpheric acid is acting as (a) a drying agent (b) and oxidizing agents (c) a dehydrating agent (d) a reducing agent (c) a hydrolyzing agent.

MATHEMATICS

1. Simplify $2^{5}/_{12}-1^{7}/_{8}$ (a) $^{1}/_{5}$ (b) $^{13}/_{20}$ (c) $^{11}/_{30}$ (d) $^{9}/_{4}$ (e) $^{5}/_{3}$
2. PQRS is acyclic quadrilateral with PQ as diameter of the circle. If <PQS = 15° find < PQS75° find < QRS.
(a) 75° (b)$37^{1}/_{2}$° (c) $127^{1}/_{20}$ (d) 105° (e) none of the above
3. Make c [he subject of the equation a (b+c) + (5/d) -2=0
(a) $c = \frac{2d-5-b}{Ad}$ (b) $c = \frac{5-2d-b}{ad}$ (c) $c = \frac{5-2d-b}{ad}$ (d) $c = \frac{2d-5-abd}{ad}$ (e)$c = \frac{2d-ab-5}{Ad}$
4. Which values of the variable x (a) x = 0 (b) x = 3 (c) x =9, satisfy the inequalities $\frac{x+3}{0<x-1\leq 2}$?
(A) (a) (b) (c) (B) (b) (c) only (C) c only (D) none of (a), (b), (c) (E) none of he choices above
45. On each market day Mrs. Bassey walks to the market from her home at a steady speed. This journey normally takes her 2 hours to complete. She finds, however that by increasing her usual speed in km/hr. she can save 20 minutes. Find her usual speed in km/hr
(a) $1^{2}/_{3}$ (b) 2 (c)5 (d) 6 (e) 10
46 Write down the number 0.0052048 correct to three significant figures
(a) 0.005 (b) 100052 (c) 0.00520 (d) 5.2048 (e) 5204
47 The ratio of the areas of similar triangles is necessarily equal to
(a) The ratio of the corresponding sides (b) the ratio of the squares on corresponding sides
(c) the ratio oft he corresponding heights of the triangles (d) half the ratio of the corresponding, bases to the heights of the triangles (e) the ratio of the corresponding bases to the heights of the triangles
48. P and Q are fixed points and X is a variable point which moves so that angles PXQ =45°. What is the focus of X?
(a) A pair of straight lines parallel to PQ (b) The perpendicular bisector of angle PXQ (c) A are of a circle passing through P and Q (d) A circle with diameter PQ E the bisector of angle PXQ
49 A man and wife went to buy an article costing N400. The woman had 1 0% of the cost and the man 40% of the remainder. How much did they have altogether? (a)N216 (b) 200 (c) N184 (d) N 144 (e) N100
50. The weights of 30 new-born babies are given as follows:
6,9, 5, 7, 6, 7, 5, 8 5,7,5 ,8,7,8,7,16, 5,7, 6, 9, 9,7, 8, 8, 7,8,9.8. The mode is
(a) 6 (b) 5 (c) 8 (d) 7 (e) 10
51.What factor is common to all the expressions x^2 —x, $2x^2$ +x — 1 and x^2 -17
(a) x (b) x-1 (c) x + 1 (d) no common factor (e) (2x1)
52. simplify $\frac{log_{10}- log_{10}4}{log_{104}- log_{10}2}$
(a) $log_{10}2$ (b) $log_{10}8$ (c) 0 (d) $log_{10}4$ (e)21
53. 1 f (x-2) - $3x^{2}$H- 4x+l . Find f(1)
(a) 8 (b) 40 (c)7 (d) 32 (e) 21
54 A sector of a circle is bounded by two radii 7cm long and are of length 6cm. find the area of the sector.
(a) $42cm^2$ (b) $3cm^2$ (c) $21cm^2$ (d) $24cm^2$ (e) 1 $2cm^2$
55. Given that p:g - 1/3: 1/2 and q:r = $^{2}/_{5}$: $^{4}/_{7}$, find p:r
(a) 4:1 05 (b) 7:15 (c) 20:21 (d) 2:36
56 The currency used in a country is called 'matimalik' (M) and is of base seven. A lady in the country bought 4 bags of rice at M56 per bag and 3 tins of milk at M4 per tin. What is the total cost of the items she bought?
(a) M $246_{(7)}$ (b)M$242_{(7)}$ (c)M$236_{(7)}$ (d) M$341_{(7)}$ (e)M$338_{(7)}$
57 If x Is jointly proportional to the cube of y and the fourth power of z. in what ratio is x increased or decreased when y is halved and z is doubled?
(a) 4:1 increase (b) 2:1 increase (c) 1:4 decrease (d) 1 :1 no change (e) 3:4 decrease.
58. If 0,0000152 x0.00042=Ax10^{8} where 1= A< 10, find A and B
(a) A=9, B=6.38 .(b) A=6.38. B =-9 (c.) A=6.38, B=9 (d) A=6.38, B=-l (e) A=6.38, B=l
59. If x+2 and x-l are factors of the expression Lx^{3}+t-2kx^{2}+24, find the values of Land k.
A.L=6.k=-9 B. L=-2,k=l C. L =2, k=-l D. L=0,k=l. E. L=6.K=0.
60.The value of$(0.03)^{3}$-(0-02)^{3}is
(a)0.019 (b) 0.001 9 (c)0.00019 (d) 0.000019 (e) 0.000035

PHYSICS

61. Which of the following is true for the image formed by a convex mirror? I. The image is always virtual II. The image is always erect III. The image is never magnified IV. The image is never magnified V. the focal length is negative
A. I only B. I and II only C. II and III only D.I, II.III and IV only E. All five.

62. An object is placed 30cm From a concave mirror of focal length 15cm. The linear magnification of the image produced is
A. 0 B. 2/3 C.I D. 2 E.3

63 Which of the follow ing.st elements is correct? The reading of pressure on mercury diameter is independent of:
A. the cross sectional area of the tube B. the atmospheric pressure C. the density of mercury. D. the temperature of mercury E. the acceleration due to gravity

64. An electric cell has an internal resistance of 2 ohm. A current of 0.5 A is found to flow when a resistor of 5 ohms is connected across it. What is the electromotive force of the cell?
A. 5 volts B. 3.5volts C. 2.5 volts D. 1 volt E. 10 volts.

65. In electrolysis experiments a cathode of mass 5 g is found to weigh 5.0lg after a current of 5A flows for 50 seconds. What is the electrochemical equivalent of the deposited substance?
A. 0.00004g/C B. 0.00002g/C C.0.02500g/C D. 0.05000g/C E. (J.OIK 0 lg/C

66. A concave lens of focal length 20cm -forms an image ½ the size of the object. "<he object distance is: A. 150cm
B. I 00 cm C.60cm D.^{60}/7cm E. none o f these values.

67 A capacitor and a resistor are connected in series with each other and in negligible internal resistance. The potential difference a cross the terminals of the capacitor is.
A. twice the e.m.f of the accumulator B. less than the e.m.f by the potential drop across the resistor
C. zero D . T he same as the e.m.f E .greater than the e.m.f

68. Which of I he following electromagnetic waves has the shortest wavelength?
A. radio waves B. x-ray C. infra-red D. blue light E. ultraviolet

69. A weight of 1000 grams hangs from a lever 20cm to the right of the fulcrum : . A I the left is 500 gram weight 20cm from the fulcrum and a 200gr am weight x cm away no m the fulcrum what is the value o f x that will make the lever balanced?
A 50cm B20cm C 10cm D 30cm E70cm

70. Which of the following statement is correct? Silvered walls of a vacuum flask are used to prevent
A. heat loss due to conduction B. vacuum loss C. heat entry into the inner flask due to convection
D .heath loss due to radiation E heat loss due to convection

71. A magnetic' needle is suspended first at earth's north magnetic pole and then al a point on the magnetic equator.? The respective angles between the needle arid the horizontal are:
A 0° and 0° B. 60°and 60° C. 90° and 90° D. 90° and 0° E. 0° and 90°

72. The point beyond which a stretched spring does not return to its original length is called the:
A. breaking point B elastic limit C. spring constant D . elasticity point E. release point

73. Which of the following is NOT a vector quantity?
A .force B altitude C. weight D. displacement E . acceleration

74 The range of wavelengths of visible spectrum is 400nm - 7 00 nm. The wavelength of gamma rays is.
A. longer than 700 nm B. shorter than 700nm but longer than 400 nm C. 550nm D. shorter than 400nm
E. Infinite

75 A man of mass 50kg ascends a flight of stairs 5m high in 5 seconds If acceleration due to gravity is $10m^2$
A. 100W B. 200W C. 250W D.400W E. 500W

76 Which of the following arrangements in the sequence shown can be used to obtain a pure spectrum of white light:
A. source slit, diverging lens, prism, diverging lens, converging lens screen B. source, slit diverging lens prism, diverging lens, screen C. source, converging lens prism, diverging lens, screen D. source slit, diverging lens, converging lens, screen E. source slit prism diverging lens screen

77. A body rolls down a slope from a height of 100m. Its velocity at the foot of the slope is 20m/s what percentage of its initial potential energy is converted into kinetic energy
A .40% B. 35% C.20% D . 15%

78 .the mechanical advantages (MA) of an inclined planed depends on
A. its length B .Its height C. The product of its length and height
D. the ratio of its length to its height.

79. As J result of air at the top of a barometer the height of the mercury of the column is 73.5cm when it should be 75.0.cm. the volume of the space the mercury is $8.0cm^3$. Calculate the correct barometric height when the barometer reads 74.0cm and the volume of the space above the mercury is $6.0cm^3$
A. 72.0CM B.74.5CM C. 75 1CM D.76.0CM

80. 22,000J of heat is required to raise the temperature of 1.5kg of paraffin from 20°c to 30°c the specific heat capacity of paraffin.
A. $14666JKg^{-10}c^{-1}$ B. $2933JKg^{-10}$ C.4400 Jkg^{-10} c^{-1} D. $5866JKg^{-10}$ c^{-1}

DETAILED SOLUTIONS TO FUTO POST UME 2005/2006

ENGLISH

1. A—Bluntly
2. D — Protected
3. E--Impolite
4. D —On
5. B—Had started
6. A — To
7. B —Discern
8. B — Voice choirmaster
9. B — A hand full of people saved the lives of a nation
10. D—Dupe me
11. A --Oppose every motion in the house
12. B-- Embarrassed
13. B
14. D-- Returned
15. C -- Problem
16. B-Reduce the price
17. ---------
18. A---- Pag
19. D----- Four
20. A-----Friendly

CHEMISTRY

21. E-----Nitrogen, Carbon dioxide and the Rare Gas
22. D — Degradation
23. C
24. D—W is the most acidic solution
25. C —The Nitrate Of Magnesium and Iron Give the oxides
26. B-----Aluminum oxide, Calcium oxide, Zinc oxide
27. D —The Outer Electron Shell is completely filled.
28. According to Gay-Lussac law of combining volumes

$2H_2 + 0_2 \longrightarrow 2H_2O$

Ratio 2: 1: 2

40: 20: 40

Therefore, the volumes of the residual gases = 40 cm^3 of term formed + 10cm^3 unreacted Hydrogen.

Hence, total volume = 10+ 40 = 50cm^3 **-A**

29. Propyne=CH_3CCH

Molar mass = (12+lx3+ 12 x2+ 1)=40

Reacting mass = 2g;

$$\therefore mole - \frac{m}{m} - \frac{2}{4:1} - 0.05$$

$CH_3CCH + HBrCH_3 \rightarrow CHCHBr$

1mole: 1mole

0.05 : 0.05

Also molar mass of HBr = 1+80 = 81g/mol

Mass = mole x molar mass 0.05x81 = 4.05g

= 4.1g -A

30. E. ------ Ammonium Carbonate will Decompose to give Carbon Dioxide, Water and ammonia.
31. B — Have become less Energetic
32. $P_g + P_w = P_T$

Where P_g = pressure of gas

Pw = pressure of water 3.2 mmHg

P_g = 752-32 =722 mmHg

Using ideal gas equation

P= 722 mmHg

$\frac{P_1V_1}{T=30+} \frac{n7V_2}{273} = T_2T_1 = 500cm^3$

T_1 = 30 + 273 =313

P_a=760mmHgT_2=273k; V_2=?

$= \frac{777 \times 500}{303} = \frac{760 \times V_2}{273}$

=427 cm^3 ----- E

33. A— Gases are Composed of many Elastic Particles
34. E —Metals lose electrons while non –metals gain electrons during normal reaction
35. $\frac{MASS\ OF\ MATER}{MOLAR\ MASS\ OF\ THE\ MDRATTD} = \frac{x\ 020}{208+XH_2O} = \frac{(-X)}{5}$

$\frac{MASS\ OF\ DVICES}{MASS\ OF\ THE\ DRATED\ SALT}$

13.3x – 76.7x -153.92, x - $\frac{155.92}{67} - 2.0067, x = 2 - D$

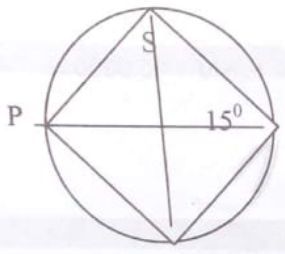
36. E — one molecule of oxygen reacts with two molecules of hydrogen to give two molecules of water.
37. B — loss of electron 33.
38. B — the avagrados number.
39. D ---they conduct electricity
40. C—dehydrating agent

MATHEMATICS

41. $2\frac{5}{12} - 7/8 \times \frac{20}{12} - \frac{29}{8} \times \frac{6}{5}$

$\frac{20}{8} - \frac{9}{1} - \frac{29-21}{12} = \frac{8}{12} = 1/6 \quad -D$

42.



<PSQ =<PROQ (angle in a semi circle)

<QPS - <QRS (angle in the same segment15°+ < QPS =90° (remaining angle in a right angled triangle)

<QOS =90^0-15°= 75^0

<QPS =QRS = 75^0-A

43 a (b+c) + (5) - 2=0 Multiple both sides by d we have ad (b+ c) + 5 - 2d =0; abd + adc = 2d-5; adc = 2d - 5-abd ; C = 2d-5-abd - D

44. $0 < \frac{9-3}{21} < 2, assure\ x-9, then\ \frac{9-3}{21} \rightarrow 0 <$ 3/2 < 2 − C

45. NB: speed (Velocity, s) = Distance (D) / Time (T)
Distance do not vary but speed and time vary
First statement S = D/2; =25 = D

46 0.0052048 =0.00520 3 Sf

47 B— the ratio of the squares on corresponding sides.

48 C—are of a circle passing through p and q

49. C The cost of the article = #400
Woman = 10% of =#400
Therefore, remainder = #400 - #40
R = #360; 40% of # 360=$\frac{40}{100}$ x 360
= 144 All together what they have
= 144+ 40 = #184 -C

50:The mode is the number that occurred most frequent Mode=7 -D

51. x^2- x x(x-1), - $2x^2$-
x – 1, - (2x -1) (x+1) x^{2+} -1- (x+1) (x-1)
none of the above - D

52. $\frac{\log_{10} 0-\log_{10} 4}{\log_{10} 4-\log_{10} 2} = \frac{\log_{10}(0/4)}{\log_{10}(4/2)}$

53.Assumef(x-2)=f(l) =x-2-l x = 5.
Then $3x^2$+4x+l = 3(3)^2 + 4(3) +1
40 -B

54. Length of arc= $\theta/360\ x\ 2\pi r$
$=\Rightarrow = \frac{\theta}{360}\ x\ 2\ x\ \frac{22}{7}\ x\ 21$-------C

55. B
56. E
57. B
58. 0.0000152 x 0.0042 = A x 10^B
=> 6.38x 10^{-9}=>A = 6.38, B=-9 -B
59.A
60. D
$(0.03)^3 - (0.02)^3$ = 1.9xl0^{-5} = 0.000019 - D

PHYSICS

61. E
62. C u = 30 cm
F=15 cm
V=?
1/U + 1/V = 1/f
1/30+1/v = 1/15; V = 30
M = u/v =30/30 = **1cm**

64. B I = 0.5A
R = 5Ω
r= 2 Ω so, E= 1(R + r)
E= 0.5 (5+2) => 3.5V

65. A Z=$\frac{m}{it}$
Where m= actual mass deposited
ie (5.01-5)=0.01 t=50s ; 1 = 50s
=>$\frac{0.01}{5\ x\ 50}$ = 0.00004g/c

66. E
67. C
68. B
69 A
70. D
71. D
72. B
73. B
74. B

75.E Power = $\frac{F\ x\ d}{T} = \frac{Mgd}{T}$
P = $\frac{50\ x\ 10\ x\ 5}{5}$= 500N

76. A
77. C
Assume a unit mass
PE=mgh = 1x10 x 100 =1000g
KE = l/2mv^2 = ½ x 1 x20^2 = 200g
Percentage conversion
= $\frac{200}{1000}$ x 100 = 20%

78. D
79. A
Pressure exerted by air
= actual Hg level - obtained Hg level
Difference in Hg level. From Boyles law
$P_1V_1 = P_2V_2$
=(75-73.5) 8 = (74-x)6
= 1.5x8 = (74-x)6 ; 74-X = $\frac{1.5\ X\ 8}{6}$ = 2.4
X= 74-2.4 = 71.6
=> X = 72.0 The correct barometric difference=> X = 72.0cm

80. A
Φ=n_i C?
WhereΦ = 22, 000 m=1.5;$?_2$-$?_1$
= 30-20=10
=>C= Φ M
=> C = 22.000 / 5x 10 = 1466.71kg^1 C^{-1}

At success Partners
Your success is our concern.
We pray for your success,
you too should pray for your
success and have faith.
Yet faith without works is dead.
You must back up your faith
with enormous work.

BEST WISHES!!!

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APPRECIATION

If you found these past questions **helpful**, here are some waysyou can **contribute** to the exam success of other students:

- **Correct an error** in this past question
- **Update** this past question
- **Submit a past question** for another school

Are you interested in contributing?