

SURE SUCCESS IN UNN POST-UTME & DIRECT ENTRY SCREENING EXAMINATIONS

TESTIMONIES

Read what these successful students are saying about
Sure Success and Henry Divine.

"The book 'SURE SUCCESS' is, no doubt, a Divine Project. The high standard of UNN POST-UTME questions calls for adequate preparation. My profound gratitude goes to the author of this book for providing the necessary preparatory material for UNN aspirants. By God's grace, I am one of the beneficiaries of the SureSuccess Project. I made a good result in my post UTME and was admitted on merit to study Pharmacy. Same can be your story if you genuinely work hard and trust God. Don't let anybody discourage you. Don't let them convince you that you must know somebody in UNN before you can gain admission there. It's not true. If you can study real hard and follow the guidelines given in this book, success will surely be yours."

Okoro KENNETH, Pharmacy.

"While preparing for my POST UTME exam, I searched endlessly for UNN Past Questions and Answers. My search finally ended when I found SURE SUCCESS. The book really helped me a lot. I am a student of the prestigious University of Nigeria, Nsukka today because I religiously studied and followed the Admission Success Tips and guidelines exposed in the book. I totally agree with Henry Divine when he says that SURE SUCCESS is more than just a book, it's a Divine Project.

My heartfelt gratitude goes to Henry Divine whom God has used to bless me. May that blessing be extended to others who may be seeking admission into UNN in years to come."

Obinna Oguji, Banking and Finance.

"I never intended to make UNN my school of choice because I was afraid of that name 'UNN'. I feared that I won't make it, but my fears vanished the day I was introduced to the book, SURE SUCCESS. The book really inspired me and showed me how easy the screening exam could be. So I made UNN my first choice of institution in JAMB. My JAMB result was good. I read SURE SUCCESS in and out before my post UTME exam and here I am today roaring in the Den.

My advice to future UNN aspirants is that they should get the book because it will surely "equip them adequately" for success in post UTME and prepare them for admission.

Mr. Henry Divine, I want to say a very big THANK YOU for your efforts in the SureSuccess Project, it's really a Divine Project. Keep it up!"

Kingsley Chidi, Microbiology.

Time and space will not permit me to write all the things on my mind about SureSuccess and Mentor Henry Divine. Sir, I want to first acknowledge you for acknowledging God in this awesome book. I pray that God will, in return, acknowledge you and your family, Amen!

As for the book, I want to render my unalloyed thanks to you for the unparalleled work you did. My admission search had been a tortuous one, filled with several years of disappointments and despair. But flipping through the pages of *SureSuccess* rekindled my lost hope and made me believe again in my God-given abilities. It was like an encounter that changed my story. I began to read long hours again with incredible assimilation and retention. At a point I felt almost sure I would gain admission this year, and I did! I'm a lion. I'm living my dreams now.

I don't know about other users but I think there is something Divine about the *SureSuccess Book*. God bless you sir. [Ben Ezika, Law]

With all sense of modesty and humility, I owe a profound gratitude to the One who has made my dream come true. I have always imagined myself being in the DEN. But considering the high academic profile of UNN and the thousands of aspirants that apply to her each year, I felt as though my dream was a mere fantasy. However, with much prayer, hard work and unflinching support from the SureSuccess Project, I've become a full-fledged Lion! For me, it's a dream come true. I wish to laud my amiable and kind-hearted HENRY DIVINE for being such an epitome of benevolence and a paragon of virtue. The guidelines, motivational words, advice and Success Tips you gave during the time of our preparations both for UTME and post-UTME made tremendous impact in our lives. I must confess that you have been a blessing to me and to so many other students out there. This affords me a much desired opportunity to say "Thank You". It is my earnest prayer that the good Lord will bless you and crown your efforts with more successes in the future.

Idu Greg, Zoology & Environmental Biology (ZEB).

It is very obvious that this exalted Institution which you desire to go to is also the dream of thousands of other candidates. That implies that you are in for a stiff competition. To stand out above the rest, you need to prepare yourself properly for success.

Compelled by the call to serve humanity and to help you actualize your *UNN Admission Dreams*, Henry Divine has not only painstakingly made his work error-proof (unlike most works of this nature) but has also embedded in it *Quick Revision Aids, Admission Success Secrets and other tips* on how to gain entrance into the DEN with less difficulty.

It is not an overstatement to say that, apart from divinity, nothing else can be of greater help in your admission search than this preparatory handbook in your hands. If you have flipped through the pages, you will attest to this fact.

If you can prayerfully and judiciously make use of **Sure Success** (the way some of us did in our own time), if you follow the guidelines therein, nothing shall stop you from becoming a LION/LIONESS this year. I can't wait to hear you ROAR!!!

Uwaoma Gentle, Medicine & Surgery (2013).

I have always desired to go very far from home for my tertiary education. I attempted UNILAG but couldn't gain admission there because I was 7 marks away from the cut-off mark of my course. This year, my brothers advised me to apply to UNN and I obliged. I filled UNN in my JAMB form but had no idea how best to prepare to get admitted on merit since I did not want a repeat of what happened to me the previous year. Then I prayed for God's perfect will and direction.

I heard about a UNN Screening Past Question called SureSuccess but didn't have a clue of how and where to get it. It wasn't until I joined myunndreams on Facebook and met HenryDivine that I got to know a lot more about SureSuccess, traced the distributor in my area and bought a copy. I sacrificed a lot just to have enough time to read through my SureSuccess and other necessary textbooks. God crowned my efforts with success. My name came out on the merit list. I'm a lioness!

Odinaka Ononye, Psychology.

Henry Divine, I just want to use this opportunity to thank you for touching my life immensely. I also thank God who sent you to me. I always nurtured this dream of becoming a lion but did not think its actualization was possible because I was not very bright academically though I know I had within me the potentials of intelligence. I guess I had no one to ignite those hidden potentials till I met you through The SureSuccess Project.

I had very little experience since it was my first time of attempting WAEC and JAMB. I managed to scale through JAMB with a score of 197 and by the grace of God; I got to know about SureSuccess Past Questions and Answers. At first, I thought that the price was a bit on the high side but something told me that since I wanted something classic, I should spend for it. I bought it anyway and I can tell you that I did not regret buying it for a day. The Admission Success Tips and Guidelines helped me to know that I needed to change my course since my JAMB score was low. Motivated by the Success Quotes, I prepared thoroughly and prayed intensely for my PUTME. By God's grace, I passed the exam with a score of 310 and was admitted on merit.

Henry Divine, you have added a lot to my height. Your SureSuccess was a blessing to me. I pray the good Lord to bless you abundantly. Finally, I want to encourage UNN aspirants. Don't ever give up on your quest for excellence. If I can be a lion today, you can also be a Lion(ess). Get yourself a copy of this unique book and take advantage of it for your success.

Onuoha Oluchukwu Simeon, BIOCHEMISTRY.

Most admission seekers in Nigeria think and believe that gaining admission into UNN is an uphill task. This might be true to an extent but I'm not here to tell you about the difficulties. I'm here to tell you how easy it actually is to gain admission into UNN if you do the right things. I don't know your history or story so far. You may have experienced series of failures and disappointments in your admission search. I also had my share of such experiences but my story changed when I came to know Henry Divine and his SureSuccess Project. He equipped me with all the necessary paraphernalia for success in UNN PUTME and by God's grace, I was admitted on merit into the prestigious Faculty of Law.

A Yoruba adage says, "When the gods have decided to bless the land with twisted yam, you have to equip yourself with a special kind of hoe to dig it up." So I must heartily commend you for getting this special UNN Admission Preparatory Handbook called SureSuccess. With it, you can unlock the secrets that have launched many into the Den. SureSuccess is uniquely packaged with the view of guiding you through the path that leads to UNN. It's well garnished with Admission Success Tips, Quick Subject Revision Aids and Motivational Quotes from numerous high flyers and the author himself. Trust me when I say, "This book is worth more than every penny you spent to get it."

Just believe in God and yourself, work very hard and in no-distant-time, you, also, will roar in the Den. Wishing you the best of Luck!

Ohajionu Chiemeka, LAW.

One of the first contents every student who diligently studied 'SureSuccess' will come across is the page titled 'Testimonies!' Of course, as the name implies, it's all about the wonderful works God does through Henry Divine and His SureSuccess Project in the lives of UNN aspirants yearly.

When I laid my hands on the long-sought-after *Sure Success Handbook*, I felt like Mungo Park admiring the estuary of the River Niger. At first glance, I set my eyes on the Testimonies. I read those testimonies over and over again. In fact, I literally coveted them. Yes, I coveted the testimonies of the likes of Onuoha Oluchukwu, Uwaoma Gentle, Odinaka Ononye and the rest. After all the Bible says, "But covet earnestly the best gifts.. 1 Cor 12:31" It depends on the best gift you see and covet. God is committed to performing what you expect by faith.

My desire was to come out of that phase in life with an outstanding result and a testimony to inspire others.

Well, yes! I worked very hard. That I know, but *Sure Success* gave me an edge over my competitors.

It was a weapon of mass destruction. Making *Sure Success* an addition to your personal hard work is like substituting Leo Messi, CR7 and Suarez into the field of play when your team is already leading with three goals. Can you picture in your mind how destructive and deadly your team will be to the other team? That's how your personal hard work plus SureSuccess will 'destroy' UNN Post UTME! What I'm telling you is a reality. I am not saying 'dem say'. What I'm saying is similar to what John said in 1st John 1:1 when he said, "...that which we have heard, which we have seen with our eyes, which we have looked upon, and our hands have handled..." So, I am saying what I know and what I have done, and the result was amazing - 333 in UNN Post UTME!

It was never my plan or wish that my name or testimony will be written on the pages of the next edition of SureSuccess, but few days after my post UTME result surfaced online, I got this from the CEO of *The Sure Success Project*:

"Good morning. Congratulations on your post UTME result. If you don't mind, you can share your testimony to be included in the next edition of SureSuccess."

I am very grateful sir Henry Divine.

I cannot conclude this piece without charging you who are yet to sit for Post UTME Screening to covet earnestly the best gifts regardless of who possesses them. Work on yourself and get (buy, spend on) the best materials you need to get to the top. Break previous records and write your name boldly on the sands of time. I wasn't just sitting down, watching and wishing that my testimony will come through like the persons I mentioned above. Faith without works is dead!

For UNN Aspirants, The SureSuccess Admission Preparatory Handbook is not like every other book. It is the pathway to the den. It is more than just a book, it is a Divine Project. It is not just *Exam-Focused*, It is **All-Round-Success-Focused**. I can write volumes on how this book changed my thoughts about many things and life in general. The Scripture says, "Buy the truth and sell it not." If you have not procured your own copy of SureSuccess, do your best to get it as soon as possible. Distance is not an issue. Waybill it. If "Nwa mmiri" like me can waybill mine from Enugu to Bayelsa, you can get yours even if you are in Sambisa.

Emmanuel Claudius Torubeli, Political Science (2018).

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HENRY DIVINE

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I wish to register my deepest and evergreen appreciation to everyone who contributed in one way or the other in making this book a reality.

Big ups to the entire members of the SURE SUCCESS PROJECT team. It's been a great privilege working with you guys.

To the members of myunndreams students' forum and all my students, thanks for believing in me.

To Project VAIC, you are doing a great job! Keep it up.

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To Mr Pauly Mbah, you are the bomb!

To the President and entire staff of Daniel Generation Foundation, your efforts at helping students develop the academic values of hard work and integrity is well appreciated.

PREFACE TO THE NEW EDITION

The highly acclaimed and widely popular Post-UTME and Direct Entry Screening revision material, **SURE SUCCESS** has been extensively revised and updated. Right from the time of publication of the first edition, I have had a lot of interactions with prospective students. The interactions reveal that the material would be better and of greater assistance to the candidates if it is upgraded to become a book covering more than just the past questions.

This new edition takes the results of my interactions with prospective students and their requests for information on admission procedures into consideration. As a result, some new and exciting features have been added to the book: Quick Revision Aids, Success Quotes, Bonus Tips, Admission Success Tips, and Answers to Frequently Asked Questions (FAQ's).

In the *Quick Revision Aids*, efforts were made to highlight some basic concepts of the subjects and to provide insights into the likely examination questions. *Success Quotes* were also included to get you motivated, because if you are motivated, then you are already half-way to your success. The *Bonus Tips* provide you with those extra information you need to have an edge over others. The *Admission Success Tips* are geared towards solving the problem of lack of admission orientation among candidates and providing answers to their *Frequently Asked Questions*.

More so, the general lay-out of the book has been improved and many of the solutions have been elaborated upon.

I wish to express my profound appreciation to the very many students/candidates who have corresponded with me by way of phone calls, text messages and e-mails since the publication of the first edition. Your suggestions are highly invaluable.

Yours sincerely,
HENRY DIVINE

PREFACE TO THE FIRST EDITION

SURE SUCCESS IN POST-UTME & DIRECT ENTRY SCREENING EXAMINATIONS is specially prepared with the aim of reducing (or completely eliminating) the problems which confront candidates preparing for POST-UTME examinations. It contains actual POST-UTME past questions solved in most practical and learning-friendly ways by experts in the various subjects. Efforts were made to not only provide the answers to the questions but also to give detailed explanations on why the answers so selected are the most suitable of all the options. It therefore offers plenty of opportunities for candidates to have unlimited practice, improve their scores and gain easy admission to the University to study their dream courses.

The core motive behind this uphill task of publishing this book is to meet the needs and aspirations of the numerous candidates who are seeking admission to the University. We hope they will turn the pages of this book as many times as possible to ensure adequate preparation, and consequently, improve their performance in the examinations.

BETA-WORLD CONCEPTS

FOREWORD

I am not here to tell UNN post-UTME candidates what they need; if you are a candidate, you know what you need.

I believe that the author of this book committed his maximum effort to help you beat this task which stands to prove your ability. I believe he dedicated himself to your success by compiling this simplified and priceless book, which has been sold to you for FREE! Not as a charity but as a right because it is your right to march into the "Den," if you make it a duty to diligently navigate your route with the help of this accurate compass. I was once on this academic crossroads called post-UTME but when I flipped the pages of this book, I saw the true path that leads to the University of Nigeria. By God's assent, I built my future upon the foundation of "SURE SUCCESS". I was admitted on merit and celebrated as one of the best because I tapped from a better source; and here I am, looking squarely and proudly at the face of my beautiful future. Procure this God-given chance to build your own future now! Here is the tool. Let no power of dissuasion or negative persuasion deter you from your task, as I wait with great optimism; hopeful of hearing you roar with pride among the pride of LIONS and LIONESSES!

I need not stress more on the substantial truths about this book, even as it rests in your hands, its truth stands tall and proud as a mountain. All it derives me is much reservation of words from the fact that this book, SURE SUCCESS, has argued its case in so able and complete manner as to leave me scarcely any more to say but question: do you really need to be a SUCCESS in UNN POST-UTME exam? This book is all you need!!

CHETACHI THANKGOD A.

*Faculty of Law,
University of Nigeria, Enugu Campus.*

USE OF ENGLISH

The past doesn't equal the future!

Whatever happened before is not destined to happen again. So if you've failed in the past, it doesn't mean you will fail again in the future.

The past is gone, so forget it.

Let's start fresh!!

USE OF ENGLISH 2005/2006 QUESTIONS [GROUP 1]

COMPREHENSION

INSTRUCTION: Read the passage carefully and answer the questions that follow.

Developments in electronic science have transformed the art of record-keeping in the modern age. Traditionally, records of events were kept only in people's minds. It depended very much on the retentive power of the human memory.

This was extremely dangerous as people either forgot events wholly or in part, or deliberately falsified details to suit their various interests. Interminable arguments were thus the order of the day. Even writing which replaced mental recording was not entirely free from these shortcomings as untruths could be written as true records either willingly or inadvertently. With the advent of the electronic memory, however, these dangers now show not only what happened, but also who did or said what, including how and when.

1. The author believes that electronic recording is
 - A. superior to mental recording.
 - B. inferior to both mental recording and writing.
 - C. superior to both mental recording and writing.
 - D. inferior to only writing.

2. The writer believes that the art of record keeping has
 - A. improved over the years.
 - B. endangered the art of writing.
 - C. changed human memory.
 - D. overcome all the problems facing it.

3. How many stages of development did the writer mention while discussing the art of record keeping?
 - A. Two
 - B. Three
 - C. Four
 - D. Five

4. According to the author, human memory is unreliable because people
 - A. die and we forget what they said.
 - B. forget events or tell lies.
 - C. do not always know when events happen.
 - D. do not always know who did what and when.

5. From the passage, we gather that writing is almost
 - A. as unreliable as human memory
 - B. as reliable as electronic memory
 - C. more reliable than electronic recording
 - D. not to be compared to any other recording systems

In questions 6 and 7, select the *option that best explains the information conveyed in the sentence.*

6. You are driving too fast for safety.
 - A. That speed is all right and safe.
 - B. That speed is not fast enough for safety.
 - C. That speed is not entirely safe.
 - D. You should drive faster to ensure safety.

7. The teacher is angry with the student.
 - A. The teacher is annoyed with the student.
 - B. The teacher is pleased with the student.
 - C. The teacher is fond of the student.
 - D. The teacher is fond of the student.

7. For all I care, the man may be dead.
 - A. I am not sure the man is dead.
 - B. I am not interested in his death.
 - C. I very much care in case he is dead.
 - D. I am ignorant of the man's death.

In each of questions 8-11, choose the most appropriate option *opposite in meaning* to the words in *italics*.

8. The priest was invited to *consecrate* the new building.
 - A. destroy
 - B. abuse
 - C. tarnish
 - D. pollute

9. A majority of those who sat for the last jamb examination are *sanguine* of success.
 - A. hopeful
 - B. unsure
 - C. pessimistic
 - D. disheartened

10. When we woke up this morning, the sky was *overcast*.
 - A. cloudy
 - B. shiny
 - C. clear
 - D. brilliant

11. Enemies of progress *secretly* strive to undermine the efforts of this administration.
 - A. secretly
 - B. consistently
 - C. boldly
 - D. overtly

In each of questions 12-15, fill the gap with the most appropriate option from the list following the gap.

12. The boy is constantly under some..... that he is the best student in the class.
 - A. elusion
 - B. delusion
 - C. illusion
 - D. allusion

13. Her parents did not approve of her marriage two years ago because she has not reached her.....
A. maturity C. majority
B. puberty D. minority
14. Our teacher.....the importance of reading over our work before submission.
A. emphasized on B. emphasized
C. layed emphasis on D. put emphasis
15. Young men should not get mixed....politics.
A. in with C. up in
B. up with D. on with

SUCCESS QUOTE

"In your quest for success, seek out for people who believe in you. Then encourage and support them, and welcome their support in return. Learn to spend more time with those who sharpen you and make you better, and less time with those who drain your energy, time and talent. The truth is, friends who speak and bring encouragement into your life are priceless. It's time to review the company you keep."

~ Henry Divine

USE OF ENGLISH 2005/2006 ANSWERS [GROUP 1]

1. The author believes that electronic recording is superior to both mental recording and writing. This is obvious from the last sentence of the passage: "the electronic memory...now show not only what happened but also who did or said what, including how and when." [C]
2. The writer believes that the art of record keeping has improved over the years. This can be deduced from the various stages of development mentioned in the passage. Each stage is an improvement on the preceding stage. [A]
3. The number of stages of development mention by the writer is three i.e. mental recording, writing and electronic recording. [B]
4. According to the author, human memory is unreliable because people forget events or tell lies. This answer is found in the opening sentence of paragraph 2: "This (human memory) was extremely dangerous as people either forgot events wholly or in part, or deliberately falsified details to suit their various interests..." [B]
5. From the passage we gather that writing is as unreliable as human memory. The choice of this answer is informed by the following sentence: "Even writing which replaced mental recording was not entirely free from these shortcomings as untruths could be written as true records either willingly or inadvertently." [A]
6. [C] - That speed is not entirely safe.
7. [B] - I am not interested in his death.

Word(s)	Opposite in meaning
8. Consecrate	D – Pollute
9. Sanguine	C – pessimistic
10. Overcast	C – clear
11. Covertly	D – overtly

12. The boy is constantly under some delusion that he is the best student in the class.

Note that options A and D cannot be the answer. So we are left with options B and C (i.e. illusion and delusion). Though the two words are similar, their meanings will help us to make a choice.

Delusion - a false belief or opinion about yourself or your situation.

Illusion - a false idea or belief, especially about something or about a situation. [B]

13. Her parents did not approve of her marriage two years ago because she has not reached her **majority**.

Note that the word majority is a legal parlance used to refer to the age of legal responsibility.

The age, generally either 18 or 21, at which somebody is legally responsible and can assume civil duties and rights such as serving on a jury, voting or marrying. [C]

14. Our teacher **emphasized** the importance of reading over our work before submission.

Note that it is only the noun form- **emphasis** that can take the preposition **on** or **upon**. So "you put/lay/place emphasis on/upon something". The verb form "**emphasise**" does not take prepositions. [B]

15. Young men should not get mixed up **in** politics.

[C]

SUMMARY OF ANSWERS {ENGLISH 2005/2006 (Group 1)}

1.C	2.A	3.B	4.B	5.A
6.C	7.B	8.D	9.C	10.C
11.D	12.B	13.C	14.B	15.C

SUCCESS QUOTE

"Work hard and pray.

Hard work without prayer leads to frustration. Prayer without hard work is self-deception, so work hard and pray."

~ Felix Diabotwe

USE OF ENGLISH 2005 QUESTIONS [GROUP 2]

COMPREHENSION

INSTRUCTION: Read the passage carefully and answer the questions that follow.

The market was old, timeless Africa, loud, crowded and free. Here, a man sat making sandals from old discarded motor-car tyres; there another worked at an old sewing machine, making a nightgown-like affair while the buyer waited; a little further on, an old goldsmith worked at his dying art, but using, now, copper filings instead of gold to fashion the lovely trinkets women wear the world over; elsewhere a woman sold country cloth fashioned with such fine art that only Africans think of it as a garment of utility. Trade was slow and loud everywhere. This was as much a social as a shopping centre. For an excuse to spend the day at the market, a woman would walk all the way from her village to town with half a dozen eggs. She would spread them on a little bit of ground for which she paid rent. Through the day she would squat on the ground and talk to others who came for the same reason. She would refuse to sell her wares till it was time to leave. They were the excuse for her being there. There were many like that. But there were many others for whom trade was an earnest business. Whether in earnest or as an excuse, the traders were boisterously free, loud-mouthed and happy. The laughter of the market was a laughter found nowhere else in all the world.

- According to the passage, the woman with half a dozen eggs in the market
 - is doing earnest business.
 - comes purposely to enjoy herself.
 - is like other traders in the market.
 - does not like her husband at home.
- "An old goldsmith worked on his dying art" means that the
 - goldsmith's trade was no longer popular.
 - goldsmith was old and must soon die.
 - goldsmith knew well the art of dying.
 - goldsmith now used copper filings.
- Which of the following titles BEST reflects the content of the passage?
 - Market scene
 - An African market scene
 - Trading in the market
 - An African shopping centre
- Which of the following statements BEST illustrates the impression the writer has created about the market?
 - An old, timeless and scantily populated place.
 - A place people come to for business or pleasure.
 - An old, crowded and discarded place.
 - A place for all types of wares and laughter.

5. Which of the following groups of items may be found for sale in the market?

- A. Motor-car tyres, eggs and gold trinkets
- B. Eggs, sandals and gold trinkets
- C. Country cloth, gold trinkets and sandals
- D. Country cloth, copper trinkets and eggs

In each of questions 6-9, choose the option *nearest in meaning* to the word or phrase in italics.

6. Much of his *chagrin* he did not win the race.

- A. stupefaction
- B. disappointment
- C. shock
- D. surprise

7. Traditional rulers are not supposed to be involved in *partisan* politics.

- A. dirty
- B. party
- C. modern
- D. part-time

8. Mr. Adamu is a *dominant* partner in our business.

- A. a prominent
- B. an important
- C. an outstanding
- D. an influential

9. The patient *disregarded* the advice of the doctor.

- A. ignored
- B. disobeyed
- C. questioned
- D. respected

In each of questions 10-12, fill the gap with the *most appropriate option* from the list following the gap.

10. The lawyer pleaded with the judge to... [A. tempar
B. temper C. tamper D. taper] justice with mercy.

11. So far, no... [A. effected B. efficient C. efficacious
D. effectual] drug has been discovered as a cure for the AIDS diseases.

12. The student leaders were... [A. unduly B. undully
C. unduely D. unduelly] punished.

In each of questions 13-14, choose the word that has the same consonant sound as the one represented in the letter underlined

13. Vision
A. Mansion B. Profession C. Cession D. Precision

14. Chair
A. Chancellor B. Chiffon C. Chalet D. Champaign

In the following question, the words in capital letters have the emphatic stress. Choose the option that best fits the expression in the sentences.

15. The secretary enjoys travelling AT NIGHT.

- A. Did the secretary enjoy travelling by day
- B. Does the secretary enjoy travelling by day
- C. Who enjoys travelling by night
- D. Does the secretary hate travelling at night

USE OF ENGLISH 2005/06 ANSWERS [GRP 2]

COMPREHENSION

1. According to the passage, the woman with half a dozen eggs in the market comes purposely to enjoy herself. [B]
2. "An old goldsmith worked on his dying art" means that the goldsmith's trade was no longer popular. [A]
3. The title that best reflects the content of the passage is An African Market Scene. [B]
4. The statement that best illustrates the impression the writer has created about the market is "A place people come to for business or pleasure". [B]
5. The group of items that may be found for sale in the market include: country cloth, copper trinkets and egg. [D]

Word(s)	Nearest in Meaning
6. chagrin	B – disappointment
7. partisan	B – party
8. dominant	B – an important
9. disregarded	A – ignored

10. The lawyer pleaded with the judge to *temper* justice with mercy. [B]
11. So far, no *efficacious* drug has been discovered as a cure for the AIDS diseases. [C]
12. The student leaders were *unduly* punished. [A]
13. Vision / 'vɪʒn / Precision / pri'sɪʒn / [D]
14. Chair /tʃeə(r)/ Chancellor /tʃænsələ(r)/ [A]
15. The emphatic phrase is "at night". Options "C" and "D" contain the emphatic phrase, so they are eliminated. "A" and "B" are the likely answers, because they do not have the emphatic phrase. However, "A" is not the answer considering that the given statement is in simple present form. Therefore, "B" is the answer because it contains the opposite of the emphatic phrase, and at the same time, is in the simple present form as the given statement. [B]

SUMMARY OF ANSWERS {ENGLISH 2005/06 (Group 2)}

1.B	2.A	3.B	4.B	5.D
6.B	7.B	8.B	9.A	10.B
11.C	12.A	13.D	14.A	15.B

USE OF ENGLISH 2006/2007 QUESTIONS

COMPREHENSION

INSTRUCTION: Read the passage carefully and answer the questions that follow.

The approach to the university is being restructured to ease the flow of traffic, give better security and provide an appropriate introduction to a seat of higher learning. The Works and Services Complex is also under construction, and we intend to move into the completed (major) part of it within the next few weeks.

All these projects are being executed with an eye to aesthetics, for we recognize the important influence of a beautiful and healthy environment on its inhabitants and feel that a cluster of buildings on a small space such as we have, should be so well designed as to have a beneficial psychological and sociological effect on all members of the community.

I have gone to these lengths to itemize these examples of current development for two main reasons. Firstly, to advise you that the road diversions and other physical inconveniences currently being experienced will be on the increase because of intense development activity. We therefore appeal to you to bear with us in full knowledge and consolation that such inconveniences are temporary and will soon yield final tangible results. Secondly, to demonstrate our capacity for executing approved projects with dispatch, and to assure Government that we are up to the task. Indeed, I can assure Government that its ability to disburse funds to us will be more than matched by our capacity to collect and expend them on executing various worthy projects in record time.

1. From the passage, we can gather that

- A. there is not much consideration for the health of the inhabitants.
- B. there is deliberate effort to inconvenience the people.
- C. buildings are put up anyhow.
- D. projects are carried out without approval.
- E. the inconveniences suffered by inhabitants will be for a while.

2. Unless it can be shown that money voted for projects can be spent on them in good time,

- A. the development activity will not be intense.
- B. it will not be easy to convince the government of our executive ability.
- C. it will not be difficult to ask government for funds
- D. our final result will be unreliable.
- E. the road diversions and other inconveniences will continue.

3. An eye on aesthetics in this passage means....

- A. regard for space
- B. beneficial psychological effects
- C. regard for health
- D. consideration for beauty
- E. a cluster of buildings

4. In this passage, the author tries to explain why

- A. it is necessary to establish the Works and Services Complex in the University
- B. beauty should not be taken into consideration when building on such a small space as we

have

- C. the gateway to the university is being rebuilt
- D. a major part of the project should be completed in the next few weeks.
- E. visitors should be debarred from using the gates in the meantime

5. Which of these is NOT among the reasons given by the author for enumerating the examples of the current development?

- A. To show that we are capable of executing approved projects.
- B. To convince the government that we can be trusted with tasks.
- C. The inconvenience currently being experienced will go on indefinitely.
- D. We are fully aware of the inconveniences being caused but we do not want you to complain.
- E. We have the capacity to complete worthy projects within the scheduled time.

In each of questions 6-15, fill the gap with the most appropriate option from the list following the gap.

6. Some smugglers have created a road diversion in order to ... the new import duty.

- A. circumflex
- B. circumscribe
- C. circumspect
- D. circumvent

7. It happened that our dog is male but ... are all

females.

- A. their's B. there's
C. theirs' D. theirs

8. We can use the telephone; the lines are all....

- A. on B. off
C. up D. down

9. Ayayi cashed ... our boy's defensive error to score the equalizer.

- A. on B. in with
C. in on D. in

10. I heard that Italy's victory at the world cup the radio.

- A. in B. on
C. over D. from

11. He travels very often as if he does not know that a car runs ... Petrol.

- A. with B. by
C. on D. in

12. We were all delighted when the lady a bouncing baby boy.

- A. delivered B. brought forth
C. gave birth to D. was delivered of

13. Although the problem was simple students were able to solve it.

- A. few B. a few
C. a lot of D. little

14. Some students ... believed they can succeed in exams without working hard.

- A. many a times B. many at time
C. many a time D. many at times

15. The defendant claimed that he had been ... into making a statement.

- A. coerced B. coaxed
C. coarsed D. coerced

SUCCESS QUOTE

"The key to learning something well is repetition; the more times you go over the material, the better chance you have of storing it permanently."

~ Henry Divine

USE OF ENGLISH 2006/2007 ANSWERS

COMPREHENSION

- From the passage we can gather that the inconveniences suffered by inhabitants will be for a while. [E]
- Unless it can be shown that money voted for projects can be spent on them in good time, it will not be easy to convince the government of our executive ability. [B]
- An eye for aesthetics in the passage means consideration for beauty. [D]
- In the passage the author tries to explain why the gateway of the university is being rebuilt. [C]
- The inconvenience currently being experienced will go on indefinitely. [C]

LEXIS AND STRUCTURE

- Some smugglers have created a road diversion in order to circumvent the new import duty. [D]
- It happened that our dog is male but *theirs* are all females. [D]
- We can use the telephone; the lines are all *on*. [A]
- Ayayi cashed *in on* our boy's defensive error to score the equalizer. [C]
- I heard that Italy's victory at the world cup *on* the radio. [B]
- He travels very often as if he does not know that a car runs *on* petrol. [C]
- We were all delighted when the lady *was delivered of* a bouncing baby boy. [D]
- Although the problem was simple *few* students were able to solve it. [A]
(Reference: Question 12 of 2007/08.)
- Some students *may a time* believed they can succeed in exams without working hard. [C]
- The defendant claimed that he had been *coerced* into making a statement. [D]
(Compare with Question No 7 of Year 2008/2009.)

SUMMARY OF ANSWERS [ENGLISH 2006/2007]

1.E	2.B	3.D	4.C	5.C
6.D	7.D	8.A	9.C	10.B
11.C	12.D	13.A	14.C	15.D

USE OF ENGLISH 2007/2008 QUESTIONS

COMPREHENSION

INSTRUCTION: Read the passage carefully and answer questions 1-5 below.

Olumba removed a small black amulet from his neck and substituted a bigger one. The former was for general protection at home, the latter for protection and luck whilst travelling. Ready at last he picked up his matchet and headed for the chief's house with Ikechi behind him.

Olumba walked ahead looking upward as usual. Just what he was searching for in the sky Ikechi couldn't tell. Perhaps, his shortness accounted for this habit since he often had to look up into the faces of his taller companions. What he lacked in height he made up in solid muscle and he looked strong. His wrestling pseudonym was Agadaga, a name which meant nothing but which somehow conveyed an impression of strength.

Eze Diali, the chief, sat at one end of his reception hall ringed by the village elders whom he had called to a meeting. The rest of the hall was filled with much younger men.

"People of Chiolu," the chief began, "I have learnt that poachers from Aliakoro will be at the Great Ponds tonight. There is no doubt that they will try to steal from the Pond of Wagaba which as you know is rich in fish. Our plan tonight is to bring one or more of these thieves home alive and ask for very large ransoms. This line of action will have two effects. Firstly, it will prove our charges of poaching against the people of Aliakoro, and secondly, the payment of very large ransoms would be a deterrent. We need seven men for this venture. I call for volunteers."

"Who will head this party?" the Chief asked, looking around. Chituru, one of the elders, said: "Eze Diali, let us not waste time. Olumba is the man for the job. We all know that he has led many exploits like this one."

"We still need six men," Eze Diali said. Eager youths came surging forward. Their well-formed muscles rippled as they elbowed one another. It was difficult to choose.

"I suggest Olumba should choose his men. He knows the boys very well and his judgment should be reliable." It was Wezume, another village elder, who spoke.

1. Olumba wore amulets because he
 - A. was superstitious.
 - B. was a strong and fearless fighter.
 - C. wanted to please his wife.
 - D. wanted to instill fear in Eze Diali.
 - E. believed in their power of protection.

2. Olumba looked upwards because
 - A. he was searching for something in the sky.
 - B. this was his usual practice.
 - C. he was short and often had to look up.
 - D. he lacked height.
 - E. his wrestling pseudonym was Agadaga.

3. "Poaching" means

A. stealing	B. cracking eggs
C. fishing	D. deterring thieves
E. demanding ransoms from Aliakoro	

4. The chief called the meeting because
 - A. he wanted volunteers to go to Aliakoro
 - B. he wanted to announce the fact that there would definitely be poachers from Chiolu at the Great Ponds that night
 - C. he wanted to ask for very large ransoms because the people of Chiolu needed money for fishing
 - D. the elders had devised a plan to prevent the poaching

5. Why was Olumba chosen?
 - A. in order not to waste time
 - B. because his nickname conveyed an impression of strength
 - C. his amulets for luck was were stronger than anyone else
 - D. he had caught thieves alive before
 - E. the passage doesn't say

In each of questions 6-8 choose the word(s) that best complete the meaning in the sentence

6. We watched the woman as she stood up and ... herself more comfortably.

A. reseated	C. reseat
B. resat	D. resitted

7. The students.....the principal's appeal for calm and took to the streets.

A. deferred	C. defied
B. differed	D. defined

8. The noise from the record seller's workshop ...on my ears.

A. jeers	B. jars
C. jams	D. jabs

In question 9-11, choose the option opposite in meaning to the word(s) in italics

9. The Military Governor *upheld* the decision of his cabinet.

- | | |
|---------------|--------------|
| A. Held up | D. Abolished |
| B. Undercut | E. Reversed |
| C. Maintained | |

10. Chidi is naturally *taciturn*.

- | | |
|-------------|-------------|
| A. Friendly | D. Lively |
| B. Cheerful | E. Reserved |
| C. Dumb | |

11. James is a disco-addict. He takes his student rather *lightly*.

- | | |
|---------------|--------------|
| A. Humorously | D. Carefully |
| B. Gloomily | E. Seriously |
| C. Tediously | |

In questions 12-14 choose the words or phrases which best fill(s) the gap(s)

12. There'sventilation in this room; that's why you don't breathe well.

- | | |
|-----------|-------------|
| A. few | C. a few |
| B. little | D. a little |

13. Whenever he puts the light on, someone....to disturb him.

- | | |
|-------------|---------------|
| A. came | C. comes |
| B. has come | D. would come |

14. It ...be taken for repair after all; it's working again.

- | | |
|--------------|-------------|
| A. couldn't | C. mightn't |
| B. shouldn't | D. needn't |

In question 15 choose the word that has the same consonant sound as the one represented by the letter(s) underlined.

15. Chassis

- | | |
|----------|--------------|
| A. Chip | C. Sharp |
| B. Cheat | D. Character |

SUCCESS QUOTE

“Keep steadily before you the fact that all true success depends at last on yourself.”

~ Theodore T. Huxley

USE OF ENGLISH 2007/2008 ANSWERS

COMPREHENSION

1. Olumba wore amulets because he believed in their power of protection. [E]

2. Olumba looked upwards because this was his usual practice.

“C” is not the answer because we are not clearly told in the passage that he looked upwards because he was short and often had to look up. Rather, the passage used the technical word, “perhaps”. Technical words are words that have no clear-cut meaning concerning what is discussed in the passage. Such words must be handled with care. They include: hopefully, reasonably, probably, virtually, etc. [B]

3. Poaching means stealing.

Note that the context or environment in which a word is used is the greatest factor that determines the meaning of the word. [A]

4. The chief called the meeting because he wanted volunteers to go to Aliakoro. Option D is not the right answer because the elders were also called to the meeting. The chief informed everyone present in the meeting of the plan to bring one or more of the thieves home alive and ask for very large ransoms. Since they needed seven men for the venture, he called for volunteers. Ans. A

5. Olumba was chosen because he had caught thieves alive before. This option is correct though it is not stated explicitly in the passage. The passage says, “Olumba is the man for the job. ...he had led many exploits like this one”. [D]

LEXIS AND STRUCTURE

6. We watched the woman as she stood up and reseated herself more comfortably.

Note that to *reseat* means to seat in another place or to return to the seat previously occupied. The past tense/participle is *reseated*.

The verb *resit* means to take an exam or test again after failing the first time. The past tense/participle of *resit* is *resat*. The word *resitted* does not make sense. [A]

7. The students defied the principal's appeal for calm

and took to the streets. [C]

8. The noise from the record seller's workshop jars on my ears. [B]

9. [E] - Reversed

10. Chidi is naturally taciturn means that he tends not to say very much, in a way that seems unfriendly. [A]

11. [E] - Seriously

12. Few and a few are used in the sense of **not many**. They can only be used with plural count nouns e.g. boys, schools, etc. They cannot be used for uncountable nouns like water, information, ventilation, etc.

Little and **a little** can only be used before a non-count (or uncountable) noun. Note that few and little are used to show inadequacy whereas a few is more than few and a little is more than little.

[B]

13. [B] - comes

14. [D] - needn't

15. [C] - Sharp

SUMMARY OF ANSWERS (ENGLISH 2007/2008)

1.E	2.B	3.A	4.A	5.D
6.A	7.C	8.B	9.E	10.A
11.E	12.B	13.B	14.D	15.C

SUCCESS QUOTE

"The root of education is bitter,
but the fruit is sweet."

- Aristotle

BONUS TIP

BARE INFINITIVE

[by Uncle Stone Ede C]

Infinitive is usually the simple form of the verb preceded by the preposition "to" e.g. to eat, to write, to teach, to praise, etc.

Bare infinitive, however, means that in certain situations, some verbs within certain expressions drop the preposition "to" preceding the verb. This situation is viewed as standard English. Such verbs include: dare, make, hear, feel, let, need, know, see, help, please, watch, bid, etc. In the above words, the preposition "to" is internally understood.

Example:

I saw you eat the food.

The police made the crowd move back.

Uncle Stone helped his students pass the examination.

The above examples, especially when used in the past tense, allow the other verbs to be without "to" or "ing".

I saw you eat the food. (correct)

I saw you eating the food. (wrong)

The police made the crowd move back.
(correct)

The police made the crowd to move back.
(wrong)

Uncle Stone helped his students pass the examination. (correct)

Uncle Stone helped his students to pass the examination. (wrong)

However, in expressions like towards, look forward to,... the verb usually has the "ing" ending.

Example:

I look forward to seeing you over there.

Not: I look forward to see you over there.

USE OF ENGLISH 2008/2009 QUESTIONS

COMPREHENSION

INSTRUCTION: Read the passage carefully and answer the questions that follow it.

Mathematics is the language in which the Book of Nature is written: Mathematics is the queen of the sciences. It is universally agreed that Mathematics is the backbone of Science and Technology. For without mathematics, the engineer is but an artist or a sculptor. He can build his bridge, attest to its form and beauty, but without mathematics he cannot guarantee its reliability to serve the purpose for which it is built. Mathematics is indeed the science of sciences. It is also art of all arts. It is right, legitimate and defensible to consider mathematics as an Art. The poet, the musician, the artist and the mathematician have a lot in common. Fundamental to all their studies and works is their common interest in the logical study of related concepts and objects to form patterns which will produce beauty, harmony and order. Thus, the poet arranges words to produce a pattern called music; the artist arranges colours to produce a pattern called painting and the mathematician arranges abstract ideas into a pattern using symbols, to produce equations. Each of these patterns - the poem, the music, the painting and the equation must stand up to the test of the same order, harmony and beauty. So if Mathematics is not an art, what is art?

1. The views expressed in this passage belong to

- a. JAMB.
- b. artists.
- c. mathematicians.
- d. the poet.
- e. the author of the passage.

2. The expression "Mathematics is the queen of sciences" contains

- a. a contradiction
- b. an analogy
- c. an irony
- d. a lie
- e. nonsense

3. "Mathematics" is written with a capital M in this passage because

- a. the writer is a mathematician.
- b. the writer does not know how to use punctuation correctly.
- c. the writer wants to distinguish between concept and a subject.
- d. it is the normal way of writing about the sciences.
- e. the writer is confused.

4. The last sentence in the passage, "So if Mathematics is not an art, what is art?" is a

- a. question for the reader to answer.
- b. statement put in form of a question.
- c. question combined with a statement.
- d. mathematical question stated in words.
- e. pattern which illustrates beauty, harmony and order in language.

5. "Mathematics" can be considered as a form of art because

- a. its main principles is made use of by the arts.

b. it involves drawing in figures.

c. it is a form of Fine Arts.

d. it is a type of Graphic Arts.

e. it also involves a study of beauty, harmony and order.

In questions 6 and 7 choose the word that has been correctly spelt

6. It is not easy to jobs sweeping in the streets and on campus.

- a. maneuver
- b. manouever
- c. maneuver
- d. manoeuvre

7. The defendant claimed he had been....into making a statement.

- a. coarced
- b. coaxed
- c. coarsed
- d. coerced

In questions 8-10 choose the option that best completes the gap

8. I have reminded him that he is the only person.... can solve my problem.

- a. who
- b. which
- c. that
- d. whom

9. My sister has several food packages for my birthday party.

- a. laid on
- b. layed up
- c. laid off
- d. layed on

10. Many students were.....into rioting by the more

radical ones.

- a. guided
- b. gathered
- c. guarded
- d. goaded

In question 11 choose the option that explains the information conveyed in the sentence.

11. Posters have been printed, and would be distributed to the rank and file.
- a. to both the ordinary members and the leaders.
 - b. to those of high ranks and file.
 - c. to the leaders alone.
 - d. to the ordinary members alone.

In questions 12 and 13, choose the option nearest in meaning to the word(s) in italics

12. Because more reliable evidence is needed to prosecute the case, it is now in *abeyance*.

- a. court record
- b. suspension
- c. privacy
- d. secret

13. In the olden days, mothers of twins were never *accepted* as members of the society. They were simply.....

- a. banished
- b. excommunicated
- c. expelled
- d. ostracized

In question 14, choose the option that has the same vowel sound as the one represented by the letter(s) underlined

14. Flood
- a. Stop
 - b. Flock
 - c. Blood
 - d. Block

In question 15 choose the option that has the same consonant sound as the one represented by the letter(s) underlined

15. Echelon
- a. Church
 - b. Character
 - c. Chief
 - d. Chassis

SUCCESS QUOTE

"If you must succeed in life, you must adopt the right attitude towards challenges."

~ CNC Opekeb

USE OF ENGLISH 2008/2009 ANSWERS

COMPREHENSION

1. The views expressed in the passage belong to the author of the passage. [E]
2. The expression, "Mathematics is the queen of the sciences" contains an analogy. [B]
3. "Mathematics" is written with a capital M in the passage because the writer wants to distinguish between a concept and a subject. [C]
4. The last sentence in the passage is a statement put in form of a question. Such statements are otherwise referred to as rhetorical questions. They are asked for effect and neither expect nor require answers. [B]
5. "Mathematics" can be considered as a form of art because it also involves a study of beauty, harmony and order. [E]

LEXIS AND STRUCTURE

6. [A] - maneuver
Note that option D (manoeuvre) is also correct in American English.
7. [D] - coerced
To coerce means to make somebody do something against his or her will by using force or threats.
8. [C] - that
Note that a relative pronoun is a pronoun that refers to a previously used noun and introduces a relative clause. The relative pronouns are who, whose, whom, which, that and what.
 - Which is used for things or non-human nouns.
 - Who, Whose and Whom are used for persons only.
 - That is used for persons and things.*When superlatives, only, all, any, if is, if was, etc. occur in a sentence, the relative pronoun "that" should be used.*
9. [A]- laid on
Note that the phrasal verb "lay on" means to provide something for somebody, especially food or entertainment. The past tense/past participle of

"lay" is "laid" and the word "layed" does not make sense.

For more on this, read the Bonus Tip on the next page.

10. [D] - goaded

The word goad means to cause somebody to act; to provoke or incite somebody into action.

11. [D] - to the ordinary members alone.

Note that "rank and file" means ordinary members of an organization.

12. [B] - suspension

13. [D] - ostracized

14. Flood /flʌd/ Blood /blʌd/ [C]

15. Echelon /'e[ə]lon/, Chassis /'tʃæsɪs/ [D]

SUMMARY OF ANSWERS

[ENGLISH 2008/2009]

1.E	2.B	3.C	4.B	5.E
6.A	7.D	8.C	9.A	10.D
11.D	12.B	13.D	14.C	15.D

SUCCESS QUOTE

"Give me six hours to chop down a tree,
and I will spend the first four hours
sharpening the axe."

~Abraham Lincoln

BONUS TIP

Every year, many intelligent and hardworking admission seekers fail to gain admission into the university to study their dream courses simply because they are not promptly informed and properly guided. They don't know when and how they are supposed to do the necessary things for their admission. Some who spend their precious time and energy studying and preparing for the post UTME Screening Exam end up missing the registration because of lack of information. Don't be one of such candidates. Don't allow your efforts to be in vain. Wherever you are, make it a habit to log on to the website:

www.suresuccess.ng

several times every week for information on admission procedures and other necessary updates as they unfold.

USE OF ENGLISH 2009/2010 QUESTIONS

COMPREHENSION

INSTRUCTION: Read the passage below carefully and answer the questions 1-5 that follow.

All over the world till lately, and in most of the world till today, mankind has been following the course of nature: that is to say, it has been breeding up to maximum. To let nature take her extravagant course in the reproduction of the human race may have made sense in an age in which we were also letting her take her course in decimating mankind by the casualties of war, pestilence, and famine. Being human, we have at least revolted against that senseless waste. We have started to impose on nature's heartless play a humane new order of our own. But, once man has begun to interfere with nature, he cannot afford to stop half way. We cannot, with impunity, cut down the death-rate and at the same time allow the birth-rate to go on taking nature's course. We must consciously try to establish an equilibrium or, sooner or later, famine will stalk aboard again.

1. The author observes that

- A. war, pestilence and famine were caused by the extravagance of nature.
- B. nature was heartless and senseless.
- C. there was a time when uncontrolled birth made sense.
- D. it was wise at a time when mankind did not interfere with normal reproduction.
- E. nature was heartless in its reproductive process.

2. Which of these statements does not express the opinion of the author?

- A. mankind has started to interfere with the work of nature.
- B. many people had died in the past through want and disease.
- C. mankind should have the maximum number of children possible.
- D. mankind should take care of its children.
- E. man's present relationship with nature in matters of birth and death is a happy one.

3. "Humane" as used in the passage means

- | | |
|-------------|---------------|
| A. sensible | B. wise |
| C. human | D. benevolent |
| E. thorough | |

4. "We must consciously try to establish equilibrium" in the passage implies that mankind must

- A. realistically find an equation.
- B. strive not to be wasteful.
- C. purposely try to fight nature.
- D. try to fight nature.
- E. deliberately find a balance.

5. The main idea of this passage is that

- A. nature is heartless.

B. man should control the birth rate.

C. mankind will soon perish of starvation.

D. pestilence causes more deaths than war.

E. man should change nature's course gradually

In questions 6 and 7, select the option that best explains the information conveyed in the sentence

6. With the screening test around the corner, I've got the jitters already.

- A. I've felt confident.
- B. I've felt secured and hopeful.
- C. I'm getting anxious.
- D. I'm getting afraid

7. The teacher warned her students against resting on their laurels.

- A. relaxing on soft chairs.
- B. taking things for granted.
- C. depending on past achievements.
- D. feeling satisfied and making no new efforts.

In questions 8-11, choose the word(s) that best completes the meaning in the sentences

8. The door handle was shaky because the screws had....

- | | |
|----------|-------------|
| A. lost | B. loosed |
| C. losed | D. loosened |

9. Something is being done to detect the person who.....the crime.

- | | |
|----------------|----------------|
| A. perpetrated | B. perpetuated |
| C. performed | D. promoted |

10. The lawyer pleaded with the judge to..... justice with mercy.

- | | |
|-----------|-----------|
| A. tempar | B. temper |
| C. tamper | D. taper |

11. Obi bought five novels last week and has gone through all. He is totally a reader.

- A. vicarious B. voracious
C. vivacious D. veracious

In questions 12 and 13, choose the option nearest in meaning to the word(s) or phrase(s) in italics

12. He lost his voice *momentarily*.

- A. in a moment
B. in a split moment
C. for a brief period of time
D. without delay
E. instantly

13. In some parts of India, people are *ostracized* simply because of their ancestry.

- A. abandoned
B. shut off from society
C. refused education
D. rendered unhappy
E. hated

In questions 14–15 choose the word(s) or phrase which best fills the gap(s)

14.him in the crowd, I would have told you at once.

- A. Had it been I saw
B. If I saw
C. Had I seen
D. Should I see

15.he had insufficient qualification, he was denied admission.

- A. Hence B. For the fact
C. Being D. As

SUCCESS QUOTE

"More than 95 percent of your success will be determined by the kinds of habits that you develop over time. Endeavour to develop the habits of setting priorities, overcoming procrastination, and completing your most important tasks."

~Brian Tracy

USE OF ENGLISH 2009/2010 ANSWERS

1. The author observes that there was a time when uncontrolled birth made sense. [C]
2. Man's present relationship with nature in matters of birth and death is a happy one. [E]
3. "Humane" as used in the passage means "showing evidence of moral and intellectual advancement". [A]
4. "We must consciously try to establish an equilibrium" in the passage implies that mankind must deliberately find a balance. [E]
5. The main idea of this passage is that man should control the birth rate. [B]
6. Jitters means feelings of being anxious and nervous, especially before an important event or having to do something difficult. [C]
7. To rest on your laurels means to feel so satisfied with what you have already achieved that you do not try to do more. [D]
8. The door handle was shaky because the screws had loosened. [D]
9. Perpetrate means to commit a crime or do something wrong or evil. [A]
10. To temper something (with something) means to make something less severe by adding something that has the opposite effect. [B]
11. [B] - Voracious
12. *Momentarily* means briefly. [C]
13. [B] - Shut off from society.
14. [C] - Had I seen
15. As is a conjunction used to state the reason for something. For example, "As you were out, I left a message". [D]

SUMMARY OF ANSWERS (ENGLISH 2009/2010)

1.C	2.E	3.A	4.E	5.B
6.C	7.D	8.D	9.A	10.B
11.B	12.C	13.B	14.C	15.D

USE OF ENGLISH 2010/2011 QUESTIONS [DAY 1]

COMPREHENSION

INSTRUCTION: Read the passage carefully, and answer the questions that follow it.

Although our aim is to nurture children, Nigerian children are still subjected to severe physical, social and mental stress as they develop. So far our interest and activities have been to ensure their physical well-being through the reduction of high mortality and morbidity rates, still inadequate as this may be. But we need to examine from time to time the other needs of the Nigerian child which will ensure a totally healthy development.

We are split between two cultures our traditional and the western, a relic of our colonial past. This also affects our child rearing practices. Therefore, these practices must have a very important bearing on how the child is prepared for our world of today so that he fits into our different personalities in terms of motivation, aggressiveness, achievement and the integration of the individual into the community socially and culturally. It is important that, while we struggle with the visible organic diseases, we fix our gaze on the other important measure to attain this one a healthy child.

The process of social adjustment begins from the moment of birth. Many of our traditional birth practices ensure that the mother either carries or suckles her child immediately after birth. The baby therefore comes into close contact with the mother at this critical time. Moreover, she is forced to stay indoors with the baby for varying periods of time. By this means, the attachment of the baby to the mother, so essential for the child's ability to relate to her in future, is secured.

This crucial moment in the baby's life is now being recognized in western countries, whilst birth practices in some hospitals and maternity homes separate mother and child immediately after birth to the extent that their ability to develop a close relationship may be jeopardized. Our Nigerian child of today may, therefore, be worse off than that of yesterday. As we move towards the training of our traditional birth attendants with a view to incorporating them into our health services, healthy practices such as the one described above must be maintained and encouraged.

1. In the passage there is an attempt to explain that to ensure a totally healthy child

- A. it is necessary to concentrate on the child's physical well-being alone
- B. it is essential to reduce the high child mortality and morbidity rate
- C. it is necessary to take care of other things in addition to the child's physical well-being
- D. it is important to keep to the rules of hygiene
- E. it is necessary to copy foreign ways of bringing up children

2. It is said that differences in ways of bringing up children and educating them

- A. achieve the same results
- B. are reflected in the personalities, attitudes and achievements of the individual
- C. make people aggressive
- D. have nothing to do with educational attainments
- E. are a matter of the cultural background of the people

3. Since the training for social adjustment begins from the moment of birth, our traditional practices

- A. are too uncivilized to be helpful
- B. need to be modernized
- C. are very helpful to the proper growth of the

child

D. make the child a stranger to modern civilization
E. are the cause of under-development

4. In spite of the fact that the western countries now recognize the importance of the early period of childhood in forming a relationship, Nigerian hospitals and maternity homes

- A. copy the wrong western practice now being criticized in western countries
- B. improve on local practices and the future of the child is secure
- C. ensure that the child is brought up in the right way
- D. ensure that the child develops the right skills for establishing relationships
- E. do not know which practice to choose

5. Unless the training of our traditional birth attendant is based on healthy practices

- A. our children will be under-developed
- B. our children will be worse off than those brought up in the traditional way
- C. our medical services will be unable to provide the right services
- D. our economic progress will be adversely affected
- E. the role of the mother will be rendered useless

In the following sentences, choose the word that is

SIMILAR IN MEANING to the word italicized/
underlined in each of the sentences.

6. We consider the recent silver jubilee celebration in
the state a very *historic* event.

- A. important B. memorable
C. ancient D. critical

7. The governor's address during his recent visit to
our town was delivered *extempore*.

- A. out-of-hand B. timely
C. off-hand D. expertly

8. One of the candidates was handed over to the
police for attending the interview with *spurious*
credentials.

- A. false B. incomplete
C. unsigned D. altered

9. There is a theory that *postulates* that all Nigerian
languages derive from one source.

- A. confirms B. affirms
C. suggests D. emphasizes

10. The candidate was disqualified as a result of his
irreverent behaviour.

- A. shameful B. disrespectful
C. careless D. abnormal

In each of the questions in this section, choose the
option that best completes the gap.

11. The rain.....when the accident took place.

- A. has stopped B. stopped
C. was stopped D. had stopped

12. Players for the next FIFA world competition have
been.....

- A. choosen B. chosed
C. chosen D. choosed

13. The boy was...by snake early this morning.

- A. beaten B. bitten C. bit D. bite

14. It is desirable that you ... there when he arrives.

- A. be B. are
C. will be D. should be

15. If I ... in Udetta's position, I would go into
politics.

- A. am B. was C. were D. be

SUCCESS QUOTE

There are no gains without pains.
~ Benjamin Franklin

USE OF ENGLISH 2010/2011 ANSWERS

[day 1]

COMPREHENSION

1. In the passage there is an attempt to explain that to ensure a totally healthy child, it is necessary to take care of other things in addition to the child's physical well-being. [C]
2. It is said that differences in ways of bringing up children and educating them are reflected in the personalities, attitudes and achievements of the individual. [B]
3. Since the training for social adjustment begins from the moment of birth, our traditional practices are very helpful to the proper growth of the child. [C]
4. In spite of the fact that the western countries now recognize the importance of the early period of childhood in forming a relationship, Nigerian hospitals and maternity homes copy the wrong western practice now being criticized in western countries. [A]
5. Unless the training of our traditional birth attendants is based on healthy practices our children will be worse off than those brought up in the traditional way. [B]

LEXIS AND STRUCTURE

6. [B] - memorable
If something is *historic*, it is unusual and likely to be remembered.
7. [C] - off-hand
Extempore means "with little or no prior preparation or forethought".
8. [A] - false
Spurious simply means "plausible but false".
9. [C] - suggests
Postulate means to suggest or accept that something is true so that it can be used as basis for logical reasoning.
10. [B] - disrespectful
Irreverent means showing lack of due respect.
11. The rain had stopped when the accident took place. [D]
12. Players for the next FIFA world competition have been chosen. [C]

13. The boy was bitten by snake early this morning.

[B]

14. [A] - be

This is a test on the Subjunctive Mood.

15. [C] - were

This is another test on the Subjunctive Mood. Note that whenever demand, resolution, recommendation, wish, suggestion or prayer is involved in a sentence, the verb of the sentence should be plural, whether the subject is singular or plural.

See the Bonus Tip on this page for more explanation

SUMMARY OF ANSWERS [ENGLISH 2010/11 (Day 1)]

1.C	2.B	3.C	4.A	5.B
6.B	7.C	8.A	9.C	10.B
11.D	12.C	13.B	14.B	15.C

BONUS TIP

The subjunctive mood in English is distinguishable from the regular form of verbs (called the *indicative* mood) only in the third person present singular, which omits the final -s (as in *make* rather than *makes*), and in the forms "be" and "were" of the verb *to be*. A typical use of the subjunctive is in clauses introduced by *that* expressing a wish or suggestion:

I suggested that she *drop* by for a drink before the concert.

They demanded that he *answer* their questions.

The form "were" is used in clauses introduced by *if, as if, as though, or supposing*, as in:

If you *were* to go, you might regret it.

It's not as though he *were* an expert.

Suppose I *were* to meet you outside the theater.

The subjunctive also occurs in fixed expressions such as *as if were, be that as it may, come what may, and far be it from me*.

USE OF ENGLISH 2010/11 QUESTIONS

[DAY 2]

COMPREHENSION

INSTRUCTION: Read the passage carefully, and answer the questions that follow it.

Our planet is at risk. Our environment is under threat. The air we breathe, the water we drink, the seas we fish in, and soils we farm, the forests, animals and plants which surround us are in danger. New terms and words describe these problems - acid rain, the greenhouse effect, global warming, holes in the ozone layer, desertification and industrial pollution. We are changing our environment. More and more gases and wastes escape from our factories. Rubbish, oil spillages and detergents damage our rivers and seas. Forests give us timber and paper, but their loss results in soil erosion and also endangers wildlife.

The richer countries of the world are mainly responsible for industrial pollution. This is where most of all the commercial energy is produced. In developing countries, poverty cause people to change their environment - to overgraze grassland, to cut down trees for new land and firewood, to farm poor soil for food.

The United Nations Environmental Protection Agency says that an area of forest the size of Sierra Leone disappears every year. Trees are cut down for timber which is used for building, furniture, paper and fuel. They are also destroyed to provide land on which to graze animals and build new villages and towns. But trees have many other important uses. Trees protect the land from heavy downpour of rain and their roots help to hold the soil together. Forests are also the home of many living things. The Amazon forest contains one fifth of all the species of birds in the world. In our forests, there may be plants and animals which could help in the discovery of new medicines of crops.

To rescue and conserve our beautiful world, we must act cooperatively. Individuals, communities, nations and international associations, all have a responsibility. By learning to protect the natural environment, we can manage the earth's resources for generations to come.

1. The risk referred to in the passage is

- A. environmentally induced
- B. industrially produced
- C. man-made
- D. sociologically produced

2. From the passage, it can be deduced that the inhabitants of developing countries
- A. take more care of their environment than those in developed countries
 - B. generate more harmful industrial by-products
 - C. degrade the environment to eke out a livelihood
 - D. cut down trees only for farmlands and fuel
3. According to the passage, the size of forest depleted annually is
- A. minimal
 - B. colossal
 - C. infinitesimal
 - D. Infinite
4. The writer holds the richer countries responsible for industrial pollution because of their
- A. technological innovations
 - B. energy requirement
 - C. industrial revolution
 - D. lack of interest in environmental protection
5. The message of the writer is the
- A. need for the developed countries to assist the poorer ones
 - B. grave dangers of global warming
 - C. urgent need to protect the natural environment
 - D. need to research into other uses of the trees in our forest
- In the following sentences, choose the word that best completes the meaning in each of the sentences
6. The manager failed to control his staff because he was very
- A. rash
 - B. indiscreet
 - C. reckless
 - D. tactless
7. The usefulness of the fertilizer in modern farming should be widely
- A. diffused
 - B. disseminated
 - C. spread
 - D. scattered
8. He was the only candidate who failed the interview. So he had to bear his
- A. disaster
 - B. misfortune
 - C. catastrophe
 - D. calamity
9. The death of the night-guard continues to be a to the police.
- A. confusion
 - B. puzzle
 - C. quagmire
 - D. problem

10. A few politicians were.....from the accusation of wrong doing.
- A. restrained
 - B. rescued
 - C. absolved
 - D. precluded

In the following sentences, choose the word that is **OPPOSITE IN MEANING** to the word in italic/underlined in each of the sentences

11. The officer has commended the *cordial* relationship existing between the soldiers and the civilians.
- A. disordered
 - B. confused
 - C. strained
 - D. unfortunate
12. Many foreign experts would like to establish in this country because the environment is *congenial*.
- A. hostile
 - B. inhospitable
 - C. aggressive
 - D. offensive
13. The new chairman has exhibited *prudence* in his handling of the revenue.
- A. impudence
 - B. shabbiness
 - C. dishonesty
 - D. recklessness
14. There is no point *dissipating* energy on a useless argument.
- A. destroying
 - B. marshalling
 - C. storing
 - D. conserving
15. There is much *apathy* among youths nowadays towards reading novels.
- A. indecision
 - B. indifference
 - C. enthusiasm
 - D. inclination

SUCCESS QUOTE

"Our goals can only be reached through the vehicle of a plan, which we must fervently believe, and upon which we must vigorously act. There is no other route to success."

— Stephen A. Brewster

USE OF ENGLISH 2010/2011 ANSWERS

[day 2]

COMPREHENSION

1. Our planet is at risk because our environment is under threat. This threat comes in form of changes (to the environment) induced by man's activities on the earth. This is captured by the sentence, "We are changing our environment." in the first paragraph. [C]
2. From the passage, it can be deduced that the inhabitants of developing countries degrade the environment to eke out a livelihood. [C]
3. According to the passage, the size of the forest depleted annually is colossal. [B]
4. The fact that the writer holds the richer countries responsible for industrial pollution is obvious from the topic sentence of the second paragraph. In the first supporting sentence of this paragraph, the writer says that his reason for holding the richer countries responsible for industrial pollution is because that "is where most of all the commercial energy is produced". [B]
5. The message of the writer is the urgent need to protect the natural environment. [C]

LEXIS AND STRUCTURE

6. The manager failed to control his staff because he was very tactless. That means he was not concerned about upsetting or offending his staff. [D]
7. The usefulness of the fertilizer in modern farming should be widely disseminated. [B]
8. He was the only candidate who failed the interview. So he had to bear his misfortune. Note that *misfortune* means an unfortunate state resulting from unfavorable outcomes. It means the same thing as *ill-luck*. [B]
9. The death of the night-guard continues to be a puzzle to the police. Note that *puzzle* is a thing that is difficult to understand or answer; a mystery. [B]
10. A few politicians were absolved from the accusation of wrong doing.
To absolve means to state publicly or officially that somebody is not guilty and not to be held

responsible. [C]

11. The word *cordial* means friendly and affectionate. The Opposite in Meaning is *strained* which means not relaxed or friendly. [C]
12. The word *congenial* here means *suitable for something; pleasant; friendly*. The Opposite in Meaning is *hostile*. [A]
13. If someone is *prudent*, he is careful and sensible when he takes decisions and avoids unnecessary risks. The Opposite in Meaning is *reckless*. [D]
14. To *dissipate* means to gradually become or make something become weaker until it disappears. The opposite in Meaning is *conserve*. [D]
15. The word *apathy* simply means lack of enthusiasm or energy. The Opposite in Meaning is *enthusiasm*. [C]

SUMMARY OF ANSWERS

[ENGLISH 2010/2011 (Day 2)]

1.C	2.C	3.B	4.B	5.C
6.D	7.B	8.B	9.B	10.C
11.C	12.A	13.D	14.D	15.C

SUCCESS QUOTE

"I know the price of success:
dedication, hard work, and a
devotion to the things you
want to see happen."
~Frank Lloyd Wright

USE OF ENGLISH 2011/2012 QUESTIONS

COMPREHENSION

INSTRUCTION: Read the following passage carefully, and answer the questions that follow.

If we examine the opportunities for education of girls or women in less developed countries, we usually find a dismal picture. In some countries, the ratio of boys to girls in secondary schools is more than seven to one. What happens to the girls? Often they are kept at home to look after younger siblings and to perform a variety of domestic chores. Their education is not perceived as in any way equal in importance to that of the boys. When a non-literate or barely literate girl reaches adolescence, she has little or no qualification for employment, even if her community provides any opportunity for the employment of women. The solution is to get her married as soon as possible, with the inevitable result that she produces children too soon, too often and too late. With no formal education, she is hardly aware that there is any alternative. In a study made in Thailand, it was noted that the literate woman marries later and ceases childbearing earlier than her non-literate counterpart. But the latter is so chained in her household by the necessities of gathering fuel, preparing food and tending children that she is very difficult to reach, even if health services, nutrition, education, maternal and child health centres are available in her community. She does not understand what they are intended to do.

1. The phrase "a dismal picture" means
 - A. a dull show
 - B. an interesting show
 - C. a sad situation
 - D. a dreadful appearance

2. According to the writer, most girls in less developed countries are not in school because
 - A. they refuse to be educated
 - B. they prefer getting married and having children
 - C. the education of boys is rated higher
 - D. the girls have no employment

3. The non-literate woman is very difficult to reach because she
 - A. does not understand the value of education and health services
 - B. is too far from the city and from school
 - C. is not permitted to go out to attend clinics for health services
 - D. can only gather fuel and prepare food

4. The phrase "too late" as used in the passage implies that the woman
 - A. ought to have stopped producing children earlier
 - B. goes on producing children when she ought to have stopped
 - C. fails to marry early enough for her to produce children
 - D. had all her children at an advanced age

5. The writer emphasizes that in less developed countries
 - A. the education of girls is not important
 - B. the non-literate woman has some advantage because she has more children

6. C. the literate female is a threat to the male in employment
D. there is a need to give boys and girls equal opportunities in education

LEXIS AND STRUCTURE

From the options in questions 6 and 7, choose the one that best completes the sentences.

6. One of the hens we bought.....ten eggs already.
 - A. have laid
 - B. has lain
 - C. has layed
 - D. has laid

7. My friend and classmate.....present when the girls insulted me.
 - A. were
 - B. is
 - C. was
 - D. are

In the following sentences, choose the word that is similar in meaning to the word underlined in each of the sentences.

8. The man's story gave us an inkling of what we went through during the war.
 - A. a taste
 - B. a possible idea
 - C. a wrong notion
 - D. a suggestion

9. The statement credited to the honourable member is an aspersion on the reputation of my company.
 - A. a libel
 - B. a slander
 - C. a condemnation
 - D. an abuse

In each of the questions 10 and 11, choose the option that has the same consonant sound as the one represented by the letter(s) underlined.

10. vision
 - A. attention
 - B. repression
 - C. intention
 - D. illusion

11. waste

- A. surtax B. cursed
C. paused D. washed

In each of questions 12 and 13, the words in capitals have the emphatic stress. Choose the option that fits the word in the sentence.

12. My brother bought EXACTLY twenty cups of rice.

- A. Who bought exactly twenty cups of beans?
B. Did your mother sell exactly twenty cups of rice?
C. Did your mother buy nearly twenty cups of rice?
D. Did your sister buy exactly twenty cups of rice?

13. It is DANGEROUS to drive without spare tyre.

- A. Is it safe to drive with spare tyre?
B. Is it safe to drive without spare tyre?
C. Is it dangerous to fly without spare tyre?
D. Is it safe to fly with spare tyre?

In the following sentences, choose the word that is opposite in meaning to the word underlined in each of the sentences.

14. Indiscreet actions have always led to regrets. that is why one should be.....

- A. judicious B. frugal
C. circumspect D. thrifty

15. His remark during the send-off party was very apt to serve as a warning.

- A. inept B. foolish
C. ridiculous D. silly

SUCCESS QUOTE

"Medical science proves that everybody is born with the same number of brain cells regardless of race, gender or family background. No one has the right to be better than you until you give him or her the right to be. You have all the *brain cells* that you need to succeed!"

~ Fela Durotoye

USE OF ENGLISH 2011/2012 ANSWERS

1. The phrase "a dismal picture" means
[C] - a sad situation.

2. According to the writer, most girls in less developed countries are not in school because
[C] - the education of boys is rated higher.

The answer is the right choice when we consider the sentence, "Their (girls) education is not perceived as in any way equal in importance to that of the boys."

3. The non-literate woman is very difficult to reach because she

[A] - does not understand the value of education and health services.

This answer is clearly stated in the last two sentences of the passage thus: "But the latter is so chained in her household...that she is very difficult to reach, even if health services, nutrition, education, maternal and child health centres are available in her community. She does not understand what they are intended to do."

4. The phrase "too late" as used in the passage implies that the woman

[B] - goes on producing children when she ought to have stopped.

5. The writer emphasizes that in less developed countries

[D] - there is a need to give boys and girls equal opportunities in education.

This answer is the right choice when we consider the topic sentence of the passage: "If we examine the opportunities for education of girls or women in less developed countries, we usually find a dismal picture."

6. [D] - has laid

Compare with Question No 9 of Year 2008/2009.

7. [C] - was

This question is from an aspect of Use of English called concord. The rule states that when two subjects are joined together by and but the two subjects refer to only one person or thing, a

singular verb should be used.

8. [B] - a possible idea.

Inkling means a faint/vague idea or a slight knowledge about a fact, event, or person.

9. [B] - a slander

An aspersion is a dangerous remark; a statement that attacks somebody's character or reputation.

10. [D] - illusion

The phonetic transcriptions are given below:
vision /vɪzən/ illusion /ɪlu:ʒn/

11. Ans. B - cursed

The phonetic transcriptions are given below:
waste /weɪst/ cursed /kɜ:s:t/

12. The correct answer is C because it contains the word (nearly) that is being contrasted to the word emphasised (exactly) in the given statement. [C]

13. Option C or D cannot be the answer because the given statement is about *driving* not *flying*. The correct answer is B because "safe" is contrasted to the word emphasised (dangerous) in the statement. [B]

14. [C] - circumspect

The word *circumspect* simply means *prudent*; taking into consideration all possible circumstances and consequences before acting. Do not confuse the spelling of *indiscreet* and *indiscrete*, which sound similar. *Indiscreet* is the more common word in general use and means "not tactful or able to keep a secret." *Indiscrete* is a much rarer formal or technical word meaning "not consisting of separate parts."

15. [A] - inept

Note that the word *apt* means very appropriate, especially suited to the circumstances. *Inept* means totally inappropriate, not in keeping with what is right or proper for the circumstances.

SUMMARY OF ANSWERS (USE OF ENGLISH 2011/2012)

1.C	2.C	3.A	4.B	5.D
6.D	7.C	8.B	9.B	10.D
11.B	12.C	13.B	14.C	15.A

USE OF ENGLISH 2012/2013 QUESTIONS

COMPREHENSION

INSTRUCTION: Read the following passage and answer the questions that follow

The diseases afflicting Western societies have undergone dramatic changes. In the course of a century, so many mass killers have vanished such that two-thirds of all deaths are now associated with the diseases of old age. Those who die young are, more often than not, the victims of accident, violence and suicide.

These changes in public health are generally equated with progress and are attributed to more or better medical care. In fact, there is no evidence of any direct relationship between changing disease patterns and the so-called progress of medicine.

The impotence of medical services to change life expectancy and the insignificance of much contemporary clinical care in the curing of diseases are all obvious, well documented but well suppressed.

Neither the proportion of doctors in a population nor the quality of the clinical tools at their disposal nor the number of hospital beds is a causal factor in the striking changes in disease patterns. The new techniques available to recognize and treat such conditions as pernicious anaemia and hypertension, or to correct congenital malformations by surgical interventions, increase our understanding of disease but do not reduce its incidence. The fact that there are more doctors where certain diseases have become rare has little to do with their ability to control or eliminate them. It simply means that doctors, more than other professionals, determine where they work. Consequently, they tend to gather where the climate is healthy, where the water is clean, and where people work and can pay for their services.

1. The statement 'the diseases afflicting Western societies have undergone dramatic changes', implies that
 - changes have taken place in the mode of disease affliction
 - medical services have been important in changing life expectancy
 - a lot of significant progress has taken place in public health
 - deaths from diseases in Western societies are minimal

2. The writer is of the view that the diseases which prevail in contemporary Western societies

- A. resulted from modern life styles
- B. are concentrated among the elderly
- C. kill many people at once
- D. are resistant to drugs

3. The author thinks that the presence of a large number of doctors in a community

- A. does not have much effect on the control of diseases
- B. distinguishes the true facts about diseases
- C. controls the spread of diseases
- D. improves the overall quality of life in the community

4. Many doctors, according to the passage, choose to live where

- A. research facilities are available
- B. they are most needed
- C. they can be near colleagues
- D. conditions are more in their favour

Correct the following sentences by choosing one the words which you consider appropriate

5. His father has a....

- A. round wooden beautiful table
- B. wooden round beautiful table
- C. beautiful wooden round table
- D. beautiful round wooden table

6. Anichebe is one of the...sportsmen.

- A. ten highly young Nigerian talented
- B. ten highly talented Nigerian young
- C. highly talented ten young Nigerian
- D. ten young highly talented Nigerian

7. Tell her I can't attend the party. ...a cold.

- A. I am having B. I have had
- C. I have got D. I have

In each of the questions 8 and 9, choose the word(s) that best completes the meaning in the sentence

8. Three policemen were killed when the bomb they were trying to....exploded

- A. difuse B. diffuse
- C. defuse D. deffuse

9. The discontented men up trouble among the workers

- A. starred B. steered
- C. stirred D. started

In each of the questions 10 to 12, choose the option that has the same consonant sound as the one represented by the letter(s) underlined

10. Yolk

- A. Could B. Build
- C. Silk D. Sulk

11. Osmosis

- A. Ostrich B. Music
- C. Scene D. Sign

12. Younger

- A. Singer B. Longer
- C. Banger D. Ringer

In each of the questions 13 to 15, choose the correct stress pattern from the options. The syllables are written in capital letters.

13. A. Reverential B. reveRENTial
C. reVErential D. reverential

14. A. orGANizer B. ORganizer
C. orgaNizer D. organizer

15. A. ultIMatum B. ultiMAtum
C. Ultimatum D. ultimaTUM

DON'T FORGET

SURE SUCCESS is more than just a book. It's a Divine Project. Don't fall into the temptation of photocopying or preparing with a photocopy of the book. You may be sowing the seed for your frustration in life.

USE OF ENGLISH 2012/13 ANSWERS

1. The statement 'the diseases afflicting Western societies have undergone dramatic changes', implies that
[A] - changes have taken place in the mode of disease affliction.
This option is correct considering the second sentence of the first paragraph.
2. The writer is of the view that the diseases which prevail in contemporary Western societies
[B] - are concentrated among the elderly.
This answer is clearly stated in the sentence: "...two-thirds of all the deaths are now associated with diseases of old age."
3. The author thinks that the presence of a large number of doctors in a community
[A] - does not have much effect on the control of diseases.
Read the topic sentence of the last paragraph to confirm this.
4. Many doctors, according to the passage, choose to live where
[D] - conditions are more in their favour.
The last two sentences of the passage read: "...doctors...tend to gather where the climate is healthy,..."

LEXIS AND STRUCTURE

5. His father has a beautiful round wooden table. **[D]**
This is a test on Order of Adjectives. Go to the Bonus Tip on the next page to read through a detailed work on place ordering of adjectives.
6. Anichebe is one of the ten young highly talented Nigerian sportsmen. **[D]**
This is another test on Order of Adjectives. Notice that there's an adverb (highly) in the sentence. Adverbs should be placed in front of

the adjectives they modify. Get more details in the Bonus Tip on the next page.

7. Tell her I can't attend the party. **I have got** a cold. **[C]**
Note that in context of the question, have is a verb of feeling and as such, cannot be used in the progressive -ing form. Verbs of feeling and thinking are rarely used in the continuous form. Such verbs are: doubt, see, hear, understand, resemble. Others are: faint, collapse, find, etc.
8. **[C]** - defuse
To defuse a bomb means to make it harmless by removing its detonating device.
9. **[C]** - stirred
10. yolk /jəʊk/ could /kud/ **[A]**
11. osmosis /ɒz'meisis/ music /'mju:zik/ **[B]**
12. younger /'jaŋge(r)/ longer /'lɔŋge(r)/ **[B]**
13. **[B]** - reveRENTial
14. **[B]** - ORganizer
15. **[B]** - ultiMAtum

SUMMARY OF ANSWERS

[USE OF ENGLISH 2012/2013]

1.A	2.B	3.A	4.D	5.D
6.D	7.C	8.C	9.C	10.A
11.B	12.B	13.B	14.B	15.B

SUCCESS QUOTE

"Whether you think you can or think you can't - you are right."
- Henry Ford

USE OF ENGLISH 2012/2013 QUESTIONS [Group 2]

COMPREHENSION

Instruction: Read the following passage and answer the questions that follow.

Over the years, there has been this hue and cry by governments and public policy advisers against the phenomenon of the rural-urban drift. Researches have been conducted on various aspects of this phenomenon, which have resulted in the identification of the various causes and consequences of it. In addition, prescriptions have been given for controlling the rural-urban drift. Among the causes most often mentioned are population pressures in some rural areas resulting in dwindling farmlands; increasing school enrolment and the resultant rise in educational levels which qualified many people for urban employment; higher wages in the urban centres relative to rural centres and the rather naive one of the 'bright lights' in the cities so much touted by early foreign sociologists.

The most often mentioned consequences of this rural-urban migration include depopulation of the rural areas leading to overcrowding of the cities and the resultant housing and sanitation problems; decline in the agricultural population resulting in less food crops being grown and high food prices in the cities; and increasing urban unemployment. The results of the phenomenon are seen largely as negative.

Measures to control the rural-urban drift include the establishment of essential amenities like water, electricity, hospitals, colleges and cinema houses; the location of employment-generating establishments and the building of good interconnecting roads. The sum total of these prescriptions in essence, unwittingly or paradoxically, is for the rural areas to be transformed into urban centres.

1. The author explains that researches conducted on various aspects of rural-urban drift have

 - A. failed to provide effective solution
 - B. revealed the causes and effects of this drift
 - C. increased the hue and cry against it
 - D. provided effective solutions to the problem

2. One of the reasons why people drift from the rural areas to the urban area is

 - A. hunger resulting from drought
 - B. laziness and ignorance
 - C. better rural education and possession of qualifications which make better jobs available in urban areas
 - D. the easy life and the comfort in the city

3. Migration in large numbers is said to result in

 - A. juvenile delinquency
 - B. a fall in the production of food, accommodation and health in cities
 - C. highway robbery
 - D. difficulty of life in rural areas

4. One suggested solution to the problem is to

 - A. provide social amenities and create employment opportunities in rural areas
 - B. encourage mechanized agriculture in order to raise income
 - C. force the young rural people to stay by warning them about the problems in cities
 - D. mount road blocks

Correct the following sentences by choosing one the words which you consider appropriate

5. Everybody knows that ... should return the gown after the matriculation.

 - A. he
 - B. he or she
 - C. they
 - D. they all

6. The senator has donated some machines to the village school.

 - A. modern duplicating large
 - B. large modern duplicating

**Correct the following sentences by choosing one
the words which you consider appropriate**

5. Everybody knows that ... should return the gown after the matriculation.

A. he B. he or she
C. they D. they all

6. The senator has donated some machines to the village school.

A. modern duplicating large
B. large modern duplicating

- C. large duplicating modern
D. modern large duplicating

7. Did I hear someone ... my name?

- A. mentioning B. to be mentioning
C. mention D. to be mentioned

8. We were asked to ... the matter, and to give our reply the following day.

- A. sleep over B. sleep on
C. sleep through D. sleep with

In each of the following questions 9 and 10, choose the option nearest in meaning to word or phrase in italics

9. We all praised the students' leaders for their *intrepid* stand during the crisis.

- A. fearless B. cheerful
C. reasonable D. impressive

10. There is a theory that *postulates* that all Nigerian languages derive from one source.

- A. confirms B. affirms
C. suggests D. emphasizes

In each question 11 to 13, choose the word that has a different stress pattern from the others

11. A. Guarantee B. Decompose
C. Afternoon D. Fortunate

12. A. Inundate B. Computer
C. Alternate (adj) D. Efficient

13. A. Galvanize B. Convocation
C. Habitable D. Momentary

In each of the questions 14 and 15, the word in capital letters has the emphatic stress. Choose the option that best fits the expression in the sentence.

14. The telephone line has been RESTORED.

- A. Has the electric light been restored?
B. Has the electric light been cut off?
C. What happened to the electric line?
D. Has the telephone line been cut off?

15. My elder brother was appointed minister of FINANCE.

- A. Was your younger brother appointed Minister of Finance?
B. Was your elder brother appointed Minister of Finance?
C. Was your elder brother appointed Commissioner of Finance?
D. Was your elder brother appointed Minister of Works?

BONUS TIP

In the book SureSuccess, we give detailed explanations to questions and show full workings in calculations because we believe that the best way to prepare is to learn and understand the rudiments of the subjects; and that should be your objective too. Don't toe the lazy path of cramming the whole past questions and their answers.

Study!

USE OF ENGLISH 2012/13 ANSWERS

[Group 2]

1. The author explains that researches conducted on various aspects of rural-urban drift have [B] - revealed the causes and effects of this drift.
The author says, "Researches have been conducted..., which have resulted in the identification of the various causes and consequences of it."
2. The author identifies "increasing school enrolment and the resultant rise in educational levels which qualified many people for urban employment" as one of the reasons for rural-urban drift. [C]
3. Migration in large numbers is said to result in a fall in the production of food, accommodation and health in cities. [B]
4. One suggested solution to the problem is to provide social amenities and create employment opportunities in rural areas. [A]
5. The pronouns "everybody" and "everyone" always take singular verbs but plural pronouns, essentially to avoid the use of "he or she". E.g. Everyone is ready to do their assignments. Everyone had their picture taken. Everybody has eaten, haven't they? [C]
6. The senator has donated some large modern duplicating machines to the village school. [B]
For a detailed explanation on this, go to the Bonus Tip on Order of Adjectives in Sentences.
7. Did I hear someone mention my name? [C]
Note that verbs which indicate physical perception are used as bare infinitive if the actions are completed. Such verbs include hear, see, notice, feel, etc. For more on this, go to the Bonus Tip on Bare Infinitive.
8. [B] - sleep on
Please note:
Sleep over means to stay the night at somebody else's home.
Sleep on something means to delay making a

decision about it until the next day, so that you have time to think about it.

9. Intrepid means fearless, courageous, bold. [A]
10. [C] - suggests
Compare with Question No 9 of year 2010/2011 (day 1).
11. [D] - fortune
12. [A] - inundate
13. [B] - convocation
14. The correct answer is D because it contains the word (cut off) that is being contrasted to the emphasized word (restored) in the given statement. Note that the other options are wrong because the question is about telephone line not electric light or line. [D]
15. The correct answer is D because it contains the word (works) that is being contrasted to the emphasized word (finance) in the given statement. [D]

SUMMARY OF ANSWERS

[USE OF ENGLISH 2012/2013 (Group 2)]

1.B	2.C	3.B	4.A	5.C
6.B	7.C	8.B	9.A	10.C
11.D	12.A	13.B	14.D	15.D

SUCCESS QUOTE

"If we commit ourselves to reading, thus increasing our knowledge, only God limits how far we can go in this world."

~ Ben Carson

USE OF ENGLISH 2013/2014 QUESTIONS

COMPREHENSION

Instruction: Read the following passage and answer the questions that follow

My good people, I come to you this evening as a man whose honesty and integrity has been questioned. Now, the usual political thing to do when charges are leveled against you is either to ignore them or deny them without giving details. But before I answer any of your questions, let me state categorically that I have not touched a kobo of the N50,000 we contributed. Every kobo of it has been used in defraying political campaign expenses.

As a matter of fact, during one of my meet-the-press conferences, Tony Agiwa *accosted* me and said, "Honourable Senator, what about this fund we hear about?" I told him there is no secret about the fund and that he should meet Abu O. Abu to get details of the fund. I told him, "You will find that the purpose of the fund was primarily to defray political expenses." In answer to another one of his questions, I said that neither contributors to this fund, nor contributors to any of my campaigns had ever received any special consideration that he would not have received as an ordinary *constituent*. And I can say that never, since I became a Senator, have I made a telephone call for them to an agency or have I gone down to an agency on their behalf. Records will show that, and all these records are in the hands of the Administrator.

1. The author is
 - A. exonerating himself from allegations of embezzlement
 - B. ignoring the allegation of embezzlement
 - C. taking part in a political campaign
 - D. demonstrating that he is a senator
 - E. trying to implicate Abu O. Abu, a fellow politician

2. Constituent in the passage means
 - A. a section of his constituency
 - B. his entire constituency
 - C. his campaigner
 - D. a person having voting right where he is living
 - E. a supporter

3. *Accosted* in the passage means
 - A. grossly insulted
 - B. greeted
 - C. fought with
 - D. forced
 - E. went and spoke to

In each of questions 4-6 choose the word or phrase which best fills the gap

4. I have my assignments....
 - A. in my hand
 - B. on my hands
 - C. on my hand
 - D. in my hands

5. We have been warned to mind how we talk to her because she is easily....
 - A. heated up
 - B. set up
 - C. hot up
 - D. het up

6. During the harmattan, we often shut the doors and windows in order to keep the cold....
 - A. out
 - B. off
 - C. down
 - D. away

In questions 7 and 8, fill each gap with the most appropriate option from the list following the gap

7. We all ... [A. heeved B. hived C. heaved D. heved] a sigh of relief when we heard he had won at the polls.

8. Having failed this examination on two occasions, I decided [A. to seek of B. to seek for C. to seek D. to ask of] advice to help me improve on my performance.

In question 9, choose the option nearest in meaning to the word in italics

9. People strongly feel that Henry won at the election because he is *silver-tongued*.
 - A. slippery
 - B. eloquent
 - C. flippant
 - D. loquacious

In the following question, select the option that best explains the information conveyed in the sentence.

10. Tom ought not to have told me.
 - A. Tom did not tell me but he should
 - B. Perhaps Tom was wrong to have told me
 - C. Tom told me but it was wrong of him
 - D. It was necessary for Tom not to tell me

USE OF ENGLISH 2013/2014 ANSWERS

1. The author is *exonerating himself from allegations of embezzlement*. [A]
2. Constituent in the passage means *a person having voting right where he is living*. [D]
3. The most suitable meaning of *Accosted* according to the passage is “went and spoke to” though strictly speaking, ‘came’ should be substituted for ‘went’ considering the direction of movement of the pressman and the position of the speaker. [E]
4. [B]
5. *Het up* is an adjective which describes someone who is anxious, excited or slightly angry. [D]
6. To *keep something out* is to prevent it from entering a place. [A]
7. [C] - heaved
8. *To seek advice* means to ask for advice. [C]
9. *Silver-tongued* is an adjective used to describe someone with great skill at persuading people to do or to believe what they say. [B]
10. Here, *ought not to have* means *shouldn't have*. [C]

SUMMARY OF ANSWERS [USE OF ENGLISH 2013/2014]

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

SUCCESS QUOTE

“Success is simple! Do what's right,
the right way, at the right time.”

~Arnold H. Glow

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USE OF ENGLISH 2014/2015 QUESTIONS

[DAY 1, MORNING SESSION]

COMPREHENSION

Instruction: Read the following passage and answer the questions that follow

It is a common *axiom* that the youths are the leaders of tomorrow. Because this statement has almost become a *cliche*, it is often taken for granted. But the reality is that as a society, we need to invest in, encourage and support the nation's youths, in order to realise a better future for the country.

As a company, Guinness Nigeria believes that the best investment in youth development is in the area of education. This belief has informed the numerous initiatives we implemented in the past or are still implementing as far as youth development is concerned.

We have therefore taken great interest in the educational sector and made significant contributions to it. Apart from contributing to the government-established Education Trust Fund (ETF), we also pursue other private initiatives to drive our interest in the Nigerian youth.

Such private industries included the Guinness Leeds Scholarship Scheme and the Chevening Scholarship operated in partnership with the British Council. Targeted at young Nigerians of university age and post-graduate students respectively, the two scholarship schemes were of immense benefit to the education-thirsty citizens of this country.

1. Axiom means

- A. a statement that everyone believes is true
- B. a statement that has become common
- C. a statement that is often taken for granted
- D. none of the above

2. Cliche means

- A. a statement which shows the reality of the society
- B. a statement which has become overused to the point of losing its effect
- C. a statement which is often taken for granted by other companies
- D. a reason why axioms are taken for granted

3. The role of Guinness Nigeria in youth development is

- A. providing scholarships
- B. supporting the government
- C. building private universities in Nigeria
- D. encouraging the society to invest in the youth

4. Nigerian youths are thirsty for

- A. education
- B. alcoholic drink
- C. scholarships
- D. all of the above

In the question 5, select the option that best explains the information conveyed in the sentence

5. Do you mind my smoking here? No, I don't mind.

- A. You can smoke here
- B. No, you can smoke outside

- C. No, you cannot smoke here
- D. You can smoke anywhere

6. From the options below, choose the correct syllabic division of the word *Photographic*.

- A. Pho-to-graph-ic
- B. Pho-tog-ra-phiC
- C. Pho-to-gra-phiC
- D. Photo-graph-ic

In question 7, choose the option nearest in meaning to the word in italics

7. Ngozi was offered a *permanent* job.

- A. regular
- B. temporary
- C. long-lasting
- D. popular

In each of the following questions choose the word or phrase which best fills the gap

8. He ... the generator immediately the light was restored.

- A. off
- B. switched off
- C. put out
- D. put off

9. Emeka ... his father.

- A. took after
- B. took on
- C. took to
- D. took up

10. Now that the examination is fast approaching, the teachers have been instructed to ... their lessons.

- A. round over
- B. round up
- C. round off
- D. round in

USE OF ENGLISH 2014/2015 ANSWERS [DAY 1, MORNING SESSION]

COMPREHENSION

1. Axiom means a statement that everyone believes is true. [A]
2. Cliche means a statement which has become overused to the point of losing its effect. [B]
3. The role of Guinness Nigeria in youth development is supporting the government by contributing to the government-established Education Trust Fund (ETF), and pursuing other private initiatives to drive their interest in the Nigerian youth. [B]
4. Nigerian youths are thirsty for education. [A]

LEXIS AND STRUCTURE

5. The question, "Do you mind my smoking here?" is another way of asking, "Do you object to my smoking here?"
The answer, "No, I don't mind." means *you can smoke here*. [A]
6. Note that syllables are defined as divisions of sounds that come together as units within a word. In carrying out syllabic division, students must bear in mind that a syllable must contain at least one vowel.
The word in question ends in *ic* and there is a rule for dividing such words into syllables: when a word ends in *ic* and the syllable next to *ic* is a meaningful syllable (for example, "graph" in photographic, "bat" in acrobatic, and "net" in phonetic), the *ic* is treated as a syllable. Hence, the correct syllabic division of *photographic* is *pho-to-graph-ic*. [A]
You can consult your Syllable Dictionary for more.
7. When someone is offered a permanent job, they are intended to serve or work for a long, indefinite period. [C]
8. He switched off the generator immediately the light was restored.
Note: *To put out* means to extinguish.
To put off means to postpone.
Off cannot be used as a verb of the sentence. [B]

9. Emeka took after his father. This means that Emeka resembles his father in features or character. [A]
10. The correct option is "**C - round off**" which means to bring to a satisfactory conclusion. Many candidates are likely to go for option **B - round up** but that is wrong. To round up means to gather or bring scattered things, people or animals. [C]

SUMMARY OF ANSWERS

[USE OF ENGLISH 2014/2015]

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

SUCCESS QUOTE

"Self-confidence is a key essential for academic success. Believing that you have what it takes to make it is the first and most important ingredient for success. Thinking that others will 'run it' for you is a sure way to fail."

~ Henry Divine

MORE USE OF ENGLISH 2014/2015 QUESTIONS (Selected From Other Sessions)

In questions 1 and 2, choose the option opposite in meaning to the word in italics

1. The class prefect was one of the main *actors* of the occasion....

- A. critics B. spectators
C. guests D. performers

2. The governor *declined* to give audience to the journalist.

- A. ignored B. accepted
C. forgot D. rejected

In the following sentences, choose the word that best completes the meaning

3. After the strike the traders the prices of their goods.

- A. beat up B. beat down
C. beat on D. beat off

4. The judge the decision of the lower court.

- A. held up B. abolished
C. upheld D. reversed

5. Professor Nweke since 1984.

- A. has been teaching B. has taught
C. was teaching D. had been taught

In questions 6 and 7, choose the option nearest in meaning to the word in italics

6. Our aunt has expressed deep appreciation for Onyinye's *invaluable* assistance during the party.

- A. immeasurable B. praiseworthy
C. selfless D. worthless

7. Many world leaders have continued to condemn the South African Prime Minister for his *inculent* posture.

- A. impetuous B. impudent
C. aggressive D. impervious

8. It is usually hard to change the course of action when one crosses the Rubicon. The underlined expression, as 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. be irrevocably committed

In the following question, select the option that best explains the information conveyed in the sentence.

9. "It is irrational for one to count one's chickens before the eggs hatched."

- A. The eggs are not to be broken
B. Not everything works out as outlined
C. One should not regard one's eggs as chickens
D. It is senseless to hatch one's eggs prematurely

In the following question, the word in capital letters has an emphatic stress. Choose the option that best fits the expression in the sentence.

10. He wrote it BOLDLY.

- A. Did she write it boldly?
B. Did he draw it boldly?
C. How did he write it?
D. Will he write it boldly?

SUCCESS QUOTE

"Even with all the money, most people without education still carry the frustration of *inferiority complex*.

Money can buy a degree but it will never buy the *satisfaction* derived from education. Never take for granted the opportunity to get a good education."

-Fela Durotoye

**ANSWERS TO MORE
USE OF ENGLISH 2014/2015 QUESTIONS**
(Selected From Other Sessions)

1. [B]
2. To *decline* means to refuse politely to *accept* or to do something. [B]
3. After the strike the traders *beat down* the prices of their goods. This means that the traders reduced the prices at which they were selling their goods. [B]
4. In a court of law, *to uphold* means to agree that a previous decision was correct or that a request is reasonable. [C]
5. The sentence is a present perfect continuous tense. It begins in the past, continues till the present with the intention of extending into the future. The structure is
Subject + has/have + been + gerund... [A]
6. *Invaluable* is used to describe something that is extremely useful, inestimable or immeasurable. Note that the opposite of *valuable* is *valueless* or *worthless*. [A]
7. When someone is *frivolous*, he aggressively or sullenly refuses to accept something or do what is asked. [C]
8. The Rubicon is a point at which any action taken commits the person taking it to a further course of action that cannot be avoided. [D]
9. When you tell someone not to count their chickens before the eggs hatch, you are trying to tell them not to be too confident that something will be successful because something may still go wrong. [B]
10. Of all the options, the question, "How did he write it?" is the only one that accurately corresponds to the statement given. It is a direct question to the given statement. [C]

SUMMARY OF ANSWERS

[**USE OF ENGLISH 2014/2015 (Other Sessions)**]

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

USE OF ENGLISH 2015/2016 QUESTIONS
Computer Based Test (CBT)

In Questions 1 - 3 choose the option **NEAREST IN MEANING** to the word in *italics*.

1. Ugo has often been described as *belligerent*.
A. attractive B. combative
C. innocent D. patient
2. Mohammed does his work with so much *ardour*.
A. enthusiasm B. discouragement
C. knowledge D. indifference
3. The policy has been *espoused* by the ruling party.
A. rejected B. outlined
C. supported D. condemned

In each of questions 4 to 5, fill each gap with the most appropriate option from the list provided.

4. 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
5. My father told me to take the money from it.
A. whoever offers B. whomever offers
C. ever who offers D. whomsoever offer

Reference Text:

Read the passage below carefully and answer the question that follows.

One day, Alan, a friend of mine, who likes country life, was fishing in a river, when he caught a trout. He tried to pull the fish in but it slipped off the hook, flew over his head and landed in a field behind him.

Alan put down his rod, went through the gate and started searching for his trout. Some people, obviously from the city, were having a picnic in the field. One of the men shouted 'What on earth are you doing?' Thinking that it was a stupid question because they could see how he was dressed, Alan replied 'Fishing'.

'Don't be silly, the fish are down in the river', answered the man. 'Fish don't live in fields!' He turned to his friends, laughing, thinking that he had made a good joke.

"Oh, but they do", said Alan. "They jump out of

the river to look for flies and I catch them with my hands. At that moment he found his trout in the grass and picked it up and showed it to the picnickers. He put it in his basket and bent down, as if he was hunting for another one. The picnickers, no longer laughing, spent the rest of the day searching the field.

6. The picnickers were

- | | |
|---------------------|----------------------------|
| A. farmers | B. from the nearby village |
| C. tourists | D. people from the city |
| E. anglers like him | |

In each of questions 7 to 8, select the option that best explains the information conveyed in the sentence.

7. The convict said he was tired of leading a dog's life. To lead a dog's life means to live

- | | |
|----------------|----------------|
| A. carelessly | B. in disgrace |
| C. in solitude | D. in misery |
| E. in poverty | |

8. The President stood his ground because the Committee members would not be persuaded to arrive at a compromise on the issue being debated.

- | | |
|----------------------------|--|
| A. yielded his position | |
| B. shifted his position | |
| C. maintained his position | |
| D. defended his position | |
| E. resisted his position | |

In questions 39 and 40 select the word OPPOSITE IN MEANING to that underlined.

9. The plebs can be found in every society of the world.

- | | |
|-----------------|----------------|
| A. masses | B. elite |
| C. middle class | D. politicians |

10. Oche entered the principal's office in a rather abrasive manner.

- | | |
|-----------|------------------|
| A. gentle | B. lackadaisical |
| C. rude | D. indifferent |

Reference Text:

Read the passage below carefully and answer the question that follows.

In 1973 a Japanese sericulturist arrived in Malawi

with a batch of 40,000 silkworm eggs. They were taken to the Bvumbwe Agricultural Research Station in Thyolo District. In this station, work is being done to determine favourable silkworm rearing conditions and areas where mulberry trees, whose leaves the worms feed on, could grow well. According to researchers, the silkworms which eventually develop into cocoons from which raw silk is produced do well in areas with warm climatic conditions.

Silk is one of the strongest of fibres. In fact, for thousands of years, silk fabrics have been regarded as the most beautiful and durable materials woven by man. Many people call silk the 'cloth of kings and queens'.

The weaving of silk originated in China. An old Chinese book, believed to be written by Confucius, tells us that the wife of Emperor Huang-ti was the first person to make fabrics of silk. Around 2640 B.C., Emperor Huang-ti asked his wife Hsi Ling-shih to study the worms that were destroying the mulberry trees in his garden. The Empress took some of the cocoons into the palace to see what they were made of. She dropped one of the cocoons into a bowl of boiling water and was amazed to see a cobweb-like tangle separate itself from the cocoon. She picked up the gauzy mass and found that one of the threads could be unwound almost without end from the cocoon. His Ling-shih had discovered silk. She was delighted with the discovery and even wove a ceremonial robe for the Emperor out of the cocoon threads. After that, the officials in the Emperor's court wore brightly dyed silk robes on important occasions.

People in other countries regarded the new fibres as something rare and beautiful. A few traders went to China to learn about making cloth from silk, but the Chinese kept their silk worms a closely guarded secret.

11. It is implied in this passage that silk was discovered

- | |
|--|
| A. after years of hard work and research by the Empress. |
| B. by accident. |
| C. in the search for a more durable fibre for making cloth. |
| D. after some experiments carried out by the Japanese sericulturist. |
| E. by design. |

Question 12 is based on Jerry Agada's *The*

Successors.

12. What did Terkura Asten do with the remaining money chief Ofege gave to him? He
A. bought a beautiful house.
B. bought two cars for his father.
C. married another wife.
D. invested in his business.

In question 13, choose the option that has the same consonant sound as the one represented by the letter(s) underlined.

13. Vision
A. mansion B. enclosure
C. nation D. capture

In the following question, choose the appropriate stress pattern from the options. The syllables are written in capital letters.

14. information
A. inforMAtion B. IНformation
C. inFORmation D. informaTION

In question 15, the word in capital letters has an emphatic stress. Choose the option that best fits the expression in the sentence.

15. The traditional chief NARRATED the story to the children.
A. The children heard the story from the traditional chief.
B. Who narrated the story to the children?
C. The children could not listen to the story by the traditional chief.
D. Did the chief hide the story from the children?

SUCCESS QUOTE

"There are no mysteries or secrets of admission success. It's all about hard work and the God-factor."

~ Henry Divine

USE OF ENGLISH 2015/2016 ANSWERS

1. A *belligerent* person is someone who is hostile or aggressive, ready to start a fight. [B]
2. Ardour means great passion, enthusiasm, or eagerness. [A]
3. To espouse a policy means to adopt or *support* it as a belief or cause. [C]
4. To be *credulous* is to be gullible; to be too easily convinced that something is true. [B]
5. My father told me to take the money from whoever offers it. [A]
For a detailed explanation on this, go to the Bonus Tip on page 45.
6. We read from the passage, "Some people, *obviously from the city*, were having a picnic in the field." So the picnickers were people from the city. [D]
7. *A dog's life* is an idiomatic expression used to describe a life which is unhappy and full of problems or unfair treatment. To lead a dog's life means to live in misery. [D]
8. To "stand one's ground" is an idiomatic expression which means to stick to or maintain one's opinion, view, position, etc. [C]
9. *Pleb* is an offensive term for an ordinary, ill-educated and unrefined person, especially somebody from a lower social class. The opposite in meaning is *elite*. [B]
10. *Abrasive* is an adjective used to describe someone who is rude and unkind; who acts in a way that may hurt other people's feelings. The opposite in meaning is *gentle*. [A]
11. It is implied in the passage that silk was discovered by accident. [B]
12. Terkura gave Helen a bonus of N150 while he used the remaining money to upgrade his company (the Tesen Group) till he was able to amass so much wealth that people started to see him as the richest man in the state. [D]

13. Vision is transcribed as /'vɪʒn/. Enclosure /in'klɔːzə(r)/ has the same consonant sound. [B]
14. Note that four syllable words with the '-ion' ending always have their primary stress on the third syllable from the left. [A]
15. The word *hide* in option D is contrasted to the emphasised word (*narrated*) in the statement. So we pick that as the correct option. [D]
For more on this, check the answer to Ques. 15 of year 2005/06 (Group 2).

SUMMARY OF ANSWERS [USE OF ENGLISH 2015/2016]

1.B	2.A	3.C	4.B	5.A
6.D	7.D	8.C	9.B	10.A
11.B	12.D	13.B	14.A	15.D

SUCCESS QUOTE

"It must be borne in your mind that there is *hardly* any such thing as 'a less competitive course.'

Nowadays, most courses are competitive. It sure takes a lot of determination and perseverance to make it into the university."

~ Henry Divine

USE OF ENGLISH 2017/2018 QUESTIONS

Computer Based Test (CBT)

In the questions 1 to 8, choose the expression or word which best completes each sentence.

1. Many African leaders cling ... to power.
A. economically B. judiciously
C. tenaciously D. furiously
2. Most newspapers help the ... public.
A. reading B. reader
C. reader's D. readable
3. After the initial confusion, the Manager's suggestion brought... to the depressed investors.
A. a glitter of hope B. a sparkle of hope
C. a raise of hope D. a glimmer of hope
4. This is the very man about ... our teacher spoke during the session.
A. whose B. whom
C. who D. which
5. The problems of Nigeria's worsening economy seem to have ... an immediate solution.
A. rejected B. defiled
C. defied D. defined
6. He is very tired. He really is ... staying up late.
A. getting used to B. got used to
C. used to D. not used to
7. The body is sensitive to changes in velocity which, if too sudden, ...
A. it may lose consciousness
B. consciousness may be lost
C. one may become unconscious
D. may cause loss of consciousness
8. The situation has deteriorated sharply, and relations between the two countries may soon be...
A. removed B. broken
C. eliminated D. withdrawn

In each of questions 9 to 10, select the option that best expresses the meaning of the phrase or word

underlined.

9. After a careful review of Adamu's last examination result, the principal concluded that his performance left much to be desired.

- A. was extremely desirable B. was very brilliant
C. was very unsatisfactory D. was very satisfactory

10. The take home pay of many workers is such that they can hardly make both ends meet.

- A. finish their schedule of work
B. live an honest life
C. keep two jobs at a time
D. live within their income

In questions 11 and 12, select the option that expresses the same idea as the one in quotes?

11. "To put something aside" is to

- A. keep in safety
B. keep something for some special purpose
C. put it in a side pocket for future use
D. put it by one's side

12. "An open secret" means

- A. an open matter
B. a fact that is very secret
C. a secret known to everybody
D. a confidential matter

In each of questions 13 and 14, choose the option *nearest in meaning* to the words in italics.

13. Most people are *vulnerable* to communicable disease.

- A. exposed B. liable
C. open D. immutable

14. The recent meeting of the two rebel leaders was a *propitious* moment for stable government in the country.

- A. delicate B. auspicious
C. important D. outstanding

15. Which of the following options has stress on the first syllable?

- A. Madam B. Command
C. Invite D. Prepare

USE OF ENGLISH 2017/2018 ANSWERS

1. *Tenacious*... tending to keep a firm hold of something; clinging or adhering closely, not readily relinquishing a position, principle, or course of action; determined. [C]

2. *Reading public* is that part of the population which regularly reads newspapers, books, etc., considered collectively. [A]

3. *A glimmer of hope* is a very small sign that something might improve or succeed, or the belief that there is a slight chance that something positive will happen. [D]

4. [B] (*Read the Bonus Tip on page 45 for a detailed explanation*)

5. The problems of Nigeria's worsening economy seem to have defied an immediate solution. *To defy* means to successfully resist something to a very unusual degree. [C]

6. He is very tired. He really is not used to staying up late. [D]

7. The body is sensitive to changes in velocity which, if too sudden, may cause loss of consciousness. [D]

8. The situation has deteriorated sharply, and relations between the two countries may soon be broken. [B]

9. *Leave much to be desired* means to be bad or unacceptable or unsatisfactory. [C]

10. *Make both ends meet* means to earn just enough money to be able to buy the things you need. [D]

11. *To put something aside* is to keep it for some special purpose or later use. [B]

12. If something is an *open secret*, many people know about it although, it is supposed to be a secret. [C]

13. The word **open** is used to qualify something or someone that is not protected and likely to suffer hurt, injury, disease, etc. The synonym is *vulnerable*. [C]

14. auspicious Presenting favorable circumstances, or showing signs of a favorable outcome or successful result. The synonym is *propitious*. [B]
15. The options are stressed as follows: *MAdam*, coMMAND, inVITE, prePARE. [A]

SUMMARY OF ANSWERS [USE OF ENGLISH 2017/2018]

1.C	2.A	3.D	4.B	5.C
6.D	7.D	8.B	9.C	10.D
11.B	12.C	13.C	14.B	15.A

DON'T FORGET

Life is spiritual.

If you patronize or prepare with any pirated form of this book instead of buying the original, the author's sweat will perpetually speak against your dreams and aspirations.

BONUS QUESTIONS

Choose the option that best completes each of the following sentences

- I'm the taste of the jollof rice you prepared.
A. tasting B. testing
- The Oba and conqueror of the enemy territories.... next week. A. arrive B. arrives
- The founder and the pastor of my church hard working. A. is B. are
- We demand she our brother's house.
A. leaves B. leave
- The blind our help. A. need B. needs
- It is no longer news that many a (*preacher*, *preachers*) these days (*talk*, *talks*) too much.
- The woman enjoyed the dance her illness.
A. despite B. inspite
- The farmer wants to the ants in his farm.
A. extinguish B. exterminate
C. eliminate D. eradicate
- All he said were recorded.
A. those B. what
C. that D. which

ANSWERS

- Ans: testing. ("taste" is not used in progressive tenses)
- Ans: arrives. (The Oba is the conqueror.)
- Ans: are. (The founder and the pastor are different persons.)
- Ans: leave. [Subjunctive mood. Read details on page 23 (Bonus Tip)]
- Ans: need. (Adjectives can be used with the article 'the' to perform the purpose of nouns. Such nouns are phrasal.)
- Ans: preacher, talks. (Many a/an.. is used to indicate a large number of something. However, it takes a singular noun, which can be followed by a singular verb.)
- Ans: despite. (The word *despite* is used to show that something happened or is true although something else might have happened to prevent it. The synonym is actually *inspite of*.)
- Ans: eliminate
- Ans: that. (Use that after superlatives: all, only, any, if is, and it was)

USE OF ENGLISH 2018/2019 QUESTIONS

Computer Based Test (CBT)

Instruction: There are 17 Questions in this section.
You are expected to answer 15 Questions only.

In each of questions 1 to 5, choose the option nearest in meaning to the word(s) in italics.

1. Mr Sam is a *dominant* partner in our industry.
A. An important B. An influential
C. An outstanding D. A prominent
2. In spite of the statement credited to some government officials, we still have our *misgivings* about their real intentions.
A. fears B. distrust
C. anxiety D. objectives
3. Modesty is one of our teacher's most *salient* characteristics.
A. provoking B. attractive
C. prominent D. useful
4. We all praised the student's leaders for their *intrepid* stand during the crisis.
A. fearless B. cheerful
C. reasonable D. impressive

5. The chairman's reaction was *a storm in a tea cup*.
A. suitable for the occasion
B. less serious than it appeared to be
C. more serious than necessary
D. greatly diminished in scope

In the questions 6 to 12, choose the word or expression which best completes each sentence.

6. He behaves as if he ... a governor.
A. is B. was
C. were D. are
7. The chairman did not take kindly to the ... remarks about his policy.
A. abusive B. dishonourable
C. derisive D. derogatory
8. Although I am watching television, I ... what you are saying.
A. am hearing B. can hear
C. have heard D. was hearing
9. The policemen who were to keep watch connived

..... the robber's escape.

- A. with B. at
C. to D. for

10. We used to serve tea in this canteen but ... the cost of milk has become very exorbitant.
A. recently B. nowadays
C. presently D. lately

In each of questions 11 to 13, choose the word that has the same vowel sound as the one represented by the letter(s) underlined.

11. Tyranny
A. high B. dye C. myth D. myopia
12. Success
A. suffer B. rubbish C. punish D. suggest
13. legal
A. many B. margin C. mineral D. rally

In each of questions 14 and 15, choose the word that has a different stress pattern from the others.

14. A. generous B. legalize
C. factious D. hazardous
15. A. misapply B. localize
C. tetanus D. ludicrous

In the questions 16 and 17, choose the word or expression which best completes each sentence.

16. Effiong can't kill a snake, ... ?
A. can't she B. could she
C. isn't it D. can she
17. The hunter, with his dog ... entering the bush.
A. are B. was
C. is D. were

SUCCESS QUOTE

"Watch your circle. Eagles soar with eagles.
The people you spend most of your time with contribute heavily to what you achieve and ultimately to what you become."

~ Henry Divine

USE OF ENGLISH 2018/2019 ANSWERS

1. *A dominant partner* is more important than most or all others. [A]
2. *Misgiving* is a feeling of doubt or suspicion about something; it means *distrust*. [B]
3. Salient means very important, noticeable or prominent. [C]
4. Intrepid means feeling no fear : fearless or brave. [A]
5. *Storm in a tea cup* refers to a situation in which people are very angry or upset about something that is not important. [C]
6. were [C] *For a more detailed explanation, go to the Bonus Tip on page 22.*
7. *Derogatory remarks* are insulting or disrespectful statements. [D]
8. *Hear* as a verb is not used in the progressive tense. [B]
9. *Connive with somebody* means to work together with somebody to do something wrong or illegal. *Connive at something* means to seem to allow something wrong to happen. *The policemen connived at the robber's escape.* [B]
10. nowadays [B]
11. tyranny /'tɪrəni/, high /haɪ/, dye /daɪ/, myth /mɪθ/, myopia /maɪ'əʊpiə/. From the transcriptions, we see that the words that have the same vowel sounds as the one represented by the underlined letter are **tyranny** and **myth**. [C]
12. success /sək'ses/, suffer /'sʌfə/, rubbish /'rʌbiʃ/, punish /'pʌniʃ/, suggest /sa'dʒɛst/. From the transcriptions, we see that the words that have the same vowel sounds as the one represented by the underlined letter are **success** and **suggest**. [D]
13. legal /'li:gəl/, many /'meni/, margin /'ma:dʒɪn/, mineral /'mɪnərəl/, rally /'ræli/. From the transcriptions, we see that the words that have the same vowel sounds as the one represented by

the underlined letter are **legal** and **mineral**. [C]

14. Note that words that end in "*-ious*" (e.g. *faction*) have their stress on the second syllable from the end. Those that end in "*-ous*" (e.g. *generous*, *hazardous*) have their stress on the third syllable from the end. *Legalize* ['li:gəlaɪz] also has the stress on the third syllable from the end. [C]
15. Of all the options, only the word *misaPPLY* has the stress on the last syllable (which is the character of words that end in "*-ly*"). [A]
16. Effiong can't kill a snake, can she? [D]
17. is [C]

SUMMARY OF ANSWERS [USE OF ENGLISH 2018/2019]

1.A	2.B	3.C	4.A	5.C	6.C
7.D	8.B	9.B	10.B	11.C	12.D
13.C	14.C	15.A	16.D	17.C	

SUCCESS QUOTE

"In your quest to actualize your admission dreams, always do the right things so that God can bless your efforts. Do not prepare with this book if it is not in the original format produced by the author. Do not use a pirated/photocopy of this work for your preparations. You may end up frustrated if you do. Call 08060848179 to get an original copy of the book SURE SUCCESS."

~ Henry Divine

USE OF ENGLISH 2019/2020 QUESTIONS

Instruction: There are 17 Questions in this section.
You are expected to answer 15 Questions only.

In each of questions 1 to 4, choose the options which best complete each sentence.

3. In many supermarkets, eggs are sold

 - A. in dozen
 - B. in dozens
 - C. by the dozen
 - D. by dozen

In each of questions 5 to 9, choose the word or phrase closest in meaning to the word(s) in italics.

5. If people don't want to play the game according to the rule, *that is their business.*

 - A. it is not their fault
 - B. they should blame others for it
 - C. other people will take over their business
 - D. they have themselves to blame

6. The discussion became *animated*.
A. specialized B. lively
C. intellectual D. unruly

7. Obe was selected for the post because he is a *downright* sort of person.

A. forthright B. outright
C. busy D. devoted

9. His *penny* gave him a lifetime of hunger.
A. avariciousness B. affluence
C. poverty D. penny pinching

10. Something drastic should be done to save this country's ... economy.
A. bartered B. batered
C. battered D. batterred

11. Each time we peeped into the library, we found our teacher ... over a book.
A. poring B. pouring
C. putting D. pooring

12. Their high ... was an advantage.
A. moral B. morality
C. morale D. morals

13. John would you mind lifting this box?
A. Yes, I mind. B. No, I don't.
C. Yes, I don't mind. D. No, I mind.

In questions 14 to 17, choose the appropriate option in the constructions.

SUCCESS QUOTE

"For every reason it's not possible, there are hundreds of people who have faced the same circumstances and succeeded."

- Jack Canfield

USE OF ENGLISH 2019/2020 ANSWERS

1. This is a case of indirect or reported speech.
Normally, the tense in reported speech is one tense back in time from the tense in direct speech. [D]
2. had [D]
3. Eggs are sold *by the dozen* means that they are sold in groups of 12. [C]
4. Notice that each member of the team received a medal. One of the rules of concord is that a plural verb is used when members in a collective noun are considered individually. [B]
5. they have themselves to blame [D]
6. *Animated* means full of life or excitement; lively. [B]
7. *Downright* is used to describe something that is characterised by plain blunt honesty. The nearest in meaning here is **forthright**. [A]
8. *Apposite* means suitable and right for the occasion; appropriate. [C]
9. *Penury* is the state of being very poor; extreme poverty. [C]
10. battered [C]
11. *To pore over something* means to look at or study something, usually a book or document, carefully. [A]
12. Note the following
 - As a noun, a *moral* is the lesson learned from a story – often used in the expression, “*the moral of the story*.”
 - The plural form, *morals*, has a different meaning. It refers to a person’s standards of determining right and wrong.
 - The adjective **moral** refers to things related to ethics (matters of right/wrong).
 - But the noun **morale** is completely different. It means the state of spirit/emotions of a group of people – their general confidence and cheerfulness. [C]
13. No, I don’t. [B]
For more explanation, go to the answer to Question No 5 of 2014/2015, Dep 1.
14. When using ‘substitute’ as a verb, the structure is: *substitute (new thing) for (original thing)*. [A]

15. no knowing [C]

16. Note that when the word ‘*damage*’ is used to refer to physical harm that impairs the value, usefulness or normal function of something, it takes no ‘s.’ *Damages* is the money paid to compensate for the damage done. [D]
17. If one thing leads to another, we say that the first (cause) results *in* the other (the effect). It is a common error to say, “results to.” However, if we are talking from the point of view of the effect and making reference to its cause, we say “result from”. For example, the sentence can be rephrased as follows: “The expulsion of the ringleaders resulted *from* the students’ unrest.” [B]

SUMMARY OF ANSWERS [USE OF ENGLISH 2019/2020]

1.D	2.D	3.C	4.B	5.D	6.B
7.A	8.C	9.C	10.C	11.A	12.C
13.B	14.A	15.C	16.D	17.B	

BONUS TIP

Stages you must pass through in your quest to become a student of UNN.

- JAMB Prep
- Post-UTME Screening
- Admission
- Acceptance of Admission
- Payment of School fees
- Clearance at the faculty
- Struggle to secure bedspace/hostel accommodation
- Hostel clearance
- Creation of Students Profile
- Getting your UNN Student’s Email Address
- Getting your Lionet Wi-fi login details
- And so on.

For each of the above stages and procedures, there are resources and informative articles on our website: www.suresuccess.ng

Make the website your companion as we are committed to shielding you from unnecessary struggles and avoidable mistakes.

Best wishes...

PHYSICS

**We absorb a lot more information if
we learn in small, manageable
portions, instead of trying to learn
everything at once.**

**Break it down! Study small sections,
take a break, then study again.**

PHYSICS 2005/2006 QUESTIONS

1. Which of the following represents the correct precision if the length of a piece of wire is measured with a meter rule?
- A. 35mm B. 35.0mm
C. 35.00mm D. 35.01mm
2. To keep a vehicle moving at a constant speed V requires power P , from the engine. The force provided by the engine is
- A. $\frac{P}{V}$ B. $\frac{V}{P}$
C. PV D. $\frac{V}{P}$
3. Which of the following statements give the TRUE difference between evaporation and boiling?
- i. Evaporation occurs at all temperatures while boiling occurs at a fixed temperature for a given pressure
- ii. Evaporation is a surface phenomenon while boiling is an interior phenomenon
- iii. Evaporation is affected by surface area while boiling is not
- A. i and ii only B. i and iii only
C. ii and iii only D. i, ii and iii only
4. Equal masses of copper and rubber are raised to the same temperature. After sometime, the copper was observed to be at a lower temperature because
- A. the specific heat capacity of copper is lower than that of rubber.
B. copper expands more than rubber.
C. the specific heat capacity of rubber is lower than that of copper.
D. rubber expands more than copper.
5. Which of the following statements is correct about a long-sighted boy who does not put on glasses?
- A. He cannot see distant objects clearly
B. Rays of light from a close object are focused in front of the retina
C. His eyeball is too long

- D. Parallel rays of light are focused behind the retina
6. A 12V battery has an internal resistance of 0.5Ω . If a cable of 1.0Ω resistance is connected across the terminals of the battery, the current drawn from the battery is
- A. 16.0A B. 8.0A
C. 0.8A D. 0.4A
7. If two parallel wires carry currents flowing in the same direction, the conductors will
- A. attract each other
B. repel each other
C. both move in the same direction
D. have no effect on each other
8. From the generating station to each sub-station, power is transmitted at a very high voltage so as to reduce
- A. eddy current loss
B. hysteresis loss
C. heating in the cables
D. magnetic flux leakage
9. Two tuning forks of frequencies 256Hz and 260Hz are sounded close to each other. What is the frequency of the beats produced?
- A. 516Hz B. 258Hz
C. 4Hz D. 300Hz
10. The fundamental frequency of vibration of a sonometer wire may be halved by
- A. doubling the length of the wire
B. doubling the mass of the wire
C. reducing the tension by half
D. reducing the absolute temperature by half
11. A transformer has a primary coil with 500 turns and a secondary coil with 2500 turns. When the voltage input to the primary is 120V, the output is
- A. 6000V B. 600V
C. 240V D. 60V

12. The principle of operation of an induction coil is based on

- A. Ohm's law B. Ampere's law
C. Faraday's law D. Coulomb's law

13. 4g of radioactive material of half-life 10days is spilled on a laboratory floor. How long would it take to disintegrate 3.5g of the material?

- A. 11/4 days B. 8 $\frac{1}{4}$ days
C. 30 days D. 80 days

14. Which of the following statements correctly describe(s) cathode rays?

- I. They consist of tiny particles carrying negative electric charges
II. They are deflected in a magnetic field but not in an electric field
III. They consist of fast moving neutrons and are deflected in an electric field
A. i only B. iii only
C. i and ii only D. ii and iii only

15. Which of the following is most strongly deflected by a magnetic field?

- A. γ -rays B. α -rays
C. β -particles D. X-rays

SUCCESS QUOTE

"...Promotion cometh neither from the east, nor from the west, nor from the south."

~ Psalm 75 vs 6

PHYSICS 2005/2006 ANSWERS

1. The least count of a measuring device is the smallest measurement which the measuring device can be used to measure. It is otherwise referred to as reading accuracy.

For meter rule, the
reading accuracy/precision = 0.1cm = 1.0mm
Therefore, 35.0mm represents the correct precision of the measured length.

Ans. B

2. Speed = v, power = P, distance = S,
force = F, time = t, work done = W.

$$P = W/t = (F \times S)/t \rightarrow P = F \times S/t = F \times v \\ \rightarrow P = Fv \text{ and } F = P/v$$

Ans. A

3. Notice that statement (ii) looks true but it's not.
While evaporation simply takes place at the surface of the liquid, boiling takes place in all parts of the liquid.

Ans. B

4. Specific heat capacity is defined as the amount of heat that is necessary to raise the temperature of a unit mass of a substance through 1°C. A body with low specific heat capacity can get heated quickly and can equally lose that heat quickly.

Ans. A

5. A long-sighted person can see objects at a distance but cannot see close objects clearly. Long-sightedness is caused by the eyeball being too short or the eye lens not being sufficiently convergent so that rays from an object are brought to focus behind the retina.

Ans. D

6. $E = I(R+r)$

$$12 = I(0.5+1.0)=1.5I$$

$$12 = 1.5I$$

$$I = 12/1.5 = 8A$$

Ans. B

7. Ampere's law states that two parallel wires attract

each other when the currents in them flow in the same direction, but repel each other when the currents flow in opposite directions.

Ans. A

8. To reduce energy loss, electricity generated in power stations is raised to a very high voltage for transmission. A high transmission voltage means that only a relatively small current flows through the transmission cables. As you know, current produces heating effect when flowing through the cables with resistance. When the current used for transmission is small, energy loss due to heating effect on the cables is reduced, enabling more electrical power to be transferred to the users.

Ans. C

9. Note that if you have only one tuning fork, no beat frequency is heard. A beat frequency is the result of combining two (or more) frequencies. The closer the two frequencies, the lower the beat frequency, and this will become zero when they are perfectly in tune.

$$\text{Beat frequency } (f) = f_1 - f_2 \\ = 260\text{Hz} - 256\text{Hz} = 4\text{Hz}$$

Ans. C

10. For a sonometer, the relationship between f and l is an inversely proportional relationship; that is, if the length is doubled the frequency is halved, and if the octave (double frequency) is required the length is halved. **Ans. A**

$$P_i/S_i = P_j/S_j \\ 500/2500 = 120/x \\ \rightarrow x = (120 \times 2500)/500 = 600\text{V}$$

Ans. B

12. The principle of operation of an induction coil is based on Faraday's law. Michael Faraday discovered the principle of induction (i.e.

Faraday's induction law) in 1831 and did the first experiment with induction between coils of wire.

Ans. C

13. Amount remaining = $4 - 3.5 = 0.5\text{g}$

After 10days, $\frac{1}{2} \times 4\text{g} = 2\text{g}$ remains

After 20days, $\frac{1}{2} \times 2\text{g} = 1\text{g}$ remains

After 30days, $\frac{1}{2} \times 1\text{g} = 0.5\text{g}$ remains

Ans. C

14. Cathode rays (also called an electron beam) are streams of electrons (negatively charged particles) observed in vacuum tubes. They have the following properties:

- (A.) Rectilinear propagation;
- (B.) They cause fluorescence;
- (C.) They posses kinetic energy which is changed to heat when they are brought to rest;
- (D.) They can produce X-rays if they are of sufficiently high energy;
- (E.) They are deflected by electric and magnetic fields, traveling in circles in magnetic fields at right angles to their motion and in parabolas in electric fields at right angles to their motion.

Ans. A

15. Of all the options, β -particles is most strongly deflected by a magnetic field because it is very light and negatively charged. **Ans. C**

SUMMARY OF ANSWERS

[PHYSICS 2005/2006]

1.B	2.A	3.B	4.A	5.D
6.B	7.A	8.C	9.C	10.A
11.B	12.C	13.C	14.A	15.C

SUCCESS QUOTE

"When you live for a strong purpose, then hard work isn't an option. It's a necessity."

~ Steve Pavlina

PHYSICS 2006/2007 QUESTIONS

Indicate the correct option in each of the following questions

1. Which of the following is a set of vectors?
 - A. force, mass and momentum
 - B. acceleration, velocity and momentum
 - C. mass, weight and density
 - D. mass, volume and density
2. A catapult used to hold a stone of mass 500g is extended by 20cm with an applied force, F. If the stone leaves with a velocity of 40m/s, the value of F is
 - A. $4.0 \times 10^2 \text{ N/m}^2$
 - B. $2.0 \times 10^3 \text{ N}$
 - C. $4.0 \times 10^3 \text{ N}$
 - D. $4.0 \times 10^4 \text{ N}$
3. A parachute attains a terminal velocity when
 - A. its density is equal to the density of air
 - B. the viscous force of air and upthrust completely counteract its weight
 - C. it expands as a result of reduced external pressure
 - D. the viscous force of the air is equal to the sum of the weight and upthrust
4. An electrical heater is used to melt a block of ice, mass 1.5kg. If the heater is powered by a 12V battery, and a current of 20A flows through the coil, calculate the time taken to melt the block of ice at 0°C. (specific latent heat of fusion of ice = $336 \times 10^3 \text{ J/kg}$)
 - A. 76.0min
 - B. 35.0min
 - C. 21.0mn
 - D. 2.9min
5. 200g of water at 90°C is mixed with same quantity of water at 30°C. What is the final temperature?
 - A. 50°C
 - B. 60°C
 - C. 70°C
 - D. 80°C
6. The equation $P^x V^y T^z = \text{constant}$ is Charles law

- when
- A. $x=1, y=1, z=1$
 - B. $x=0, y=1, z=-1$
 - C. $x=1, y=0, z=-1$
 - D. $x=0, y=1, z=1$
7. For a short-sighted person, light rays from a point on a very distant object is focused
 - A. in front of the retina
 - B. behind the retina
 - C. behind the retina by a diverging lens
 - D. in front of the retina a distance $2F$ from the lens
 8. Dispersion of light by a glass prism is due to the
 - A. different hidden colours of the glass
 - B. different speeds of various colours in glass
 - C. defect in the glass
 - D. high density in glass
 9. To produce an enlarged and erect image with a concave mirror, the object must be positioned
 - A. between the principal focus and the centre of curvature
 - B. at the principal focus
 - C. between the principal focus and the pole
 - D. beyond the centre of curvature
 10. To convert an ac dynamo to dc dynamo, the
 - A. number of turns of the coil is increased
 - B. slip rings are replaced with a split-ring commutator
 - C. number of turns of the coil is reduced.
 - D. split-ring commutator is replaced with slip rings
 11. In an AC circuit that contains only a capacitor, the voltage
 - A. lags behind the current by 90°
 - B. leads the current by 90°
 - C. lags behinds the currents by 180°
 - D. leads the current by 180°
 12. The purpose of dielectric material in a parallel

plate capacitor is to

- A. increase the capacitance
- B. decrease its capacitance
- C. insulate the plates from each other
- D. increase the magnetic field between plates

13. A substance has a half-life of 3min. After 6mins, the count rate was observed to be 600. What was its count rate at zero time?

- A. 200
- B. 1200
- C. 1600
- D. 2400

14. If light with photon energy 2eV is incident on the surface of a metal with work function 3eV, then

- A. no electron will be emitted
- B. the few electrons emitted will have maximum kinetic energy of 1eV
- C. the few electrons emitted will have a maximum kinetic energy of 3eV
- D. many electrons will be emitted with maximum kinetic energy of 5eV

15. In a nuclear fusion experiment, the loss of mass amount to 1.0×10^{-2} kg. The amount of energy obtained from the fusion (speed of light = 3.0×10^8 m/s) is

- A. 3.0×10^7 J
- B. 3.0×10^{-7} J
- C. 9.0×10^{-7} J
- D. 9.0×10^{19} J

SUCCESS QUOTE

"If you want to make your dreams come true, the first thing you have to do is wake up."

~ Jim Power

PHYSICS 2006/2007 ANSWERS

1. Vector quantities are quantities that have both magnitude and direction e.g. acceleration, velocity, momentum, etc. **Ans. B**

2. $m = 500g = 0.5\text{kg}$; $e = 20 = 0.2\text{m}$; $v = 40\text{m/s}$
The elastic potential energy of the stretched catapult = $\frac{1}{2}Fe$, and that is equal to the kinetic energy imparted to the stone = $\frac{1}{2}mv^2$.
This implies that $\frac{1}{2}Fe = \frac{1}{2}mv^2$

$$F = \frac{mv^2}{e} = \frac{0.5 \times 40^2}{0.2} \\ = 4000 = 4.0 \times 10^3\text{N} \quad \text{Ans. C}$$

3. A parachute attains a terminal velocity when the viscous force of the air and the upthrust completely counteract its weight. **Ans. B**

4. $m = 1.5\text{kg}$, $V = 12\text{V}$, $I = 20\text{A}$, $t = ?$,
 $c = 336 \times 10^3\text{J/Kg}$.

$$mc = VIt \\ t = \frac{mc}{IV} = \frac{(1.5 \times 336 \times 10^3)}{(20 \times 12)} = 2100\text{secs} \\ t = \left(\frac{2100}{60}\right)\text{mins} = 35\text{mins} \quad \text{Ans. B}$$

5. Let the final temperature = T,

$$\theta_1 = 90^\circ, \theta_2 = 30^\circ \\ m_1c(\theta_1 - T) = m_2c(T - \theta_2)$$

But $m_1 = m_2 = 200\text{g}$

$$\rightarrow \theta_1 - T = T - \theta_2$$

$$T + T = \theta_1 + \theta_2$$

$$2T = \theta_1 + \theta_2$$

$$T = \frac{(\theta_1 + \theta_2)}{2} = \frac{(90 + 30)}{2} = \frac{120}{2}$$

$$T = 60^\circ\text{C} \quad \text{Ans. B}$$

6. The equation $P^xV^yT^z = \text{constant}$ is Charles law when $x = 0$, $y = 1$, $z = -1$.

$$V^1T^{-1} = \text{Constant}$$

$$\frac{V}{T} = \text{Constant, which is Charles law. Ans. B}$$

7. Short-sightedness (also called myopia) is a condition of the eye where the light that comes in does not directly focus on the retina but in front of it. This causes the image that one sees when looking at a distant object to be out of focus but in focus when looking at a close object. **Ans. A**

8. Dispersion of light by a glass prism is due to the different speeds that various colored rays move in glass. Each color in a ray of white light is then refracted in a slightly different direction on entering a glass prism. **Ans. B**

9. To produce an enlarged and erect image with a concave mirror, the object must be positioned between the principal focus and the pole.

Ans. C

10. To convert an a.c. dynamo to d.c. dynamo, the slip rings are replaced with a split-ring commutator. **Ans. B**

11. The phase relationship of current and voltage for purely inductive and purely capacitive circuits are opposite. A phrase that may help to remember the relationship is:

ELI the ICE man

With E representing voltage (for emf) and I representing current. ELI indicates that with an inductance (L) the voltage leads the current by 90° . Similarly ICE tells you that with a capacitance (C) the current leads the voltage by 90° . **Ans. A**

12. The purpose of dielectric material in parallel plate capacitors is to increase the capacitance of the capacitor. This means that the capacitance of a parallel plate capacitor depends on the nature of the dielectric material. **Ans. A**

13. Half-life of substance = 3mins.

At 6mins, count rate = 600
At 3mins, count rate = $2 \times 600 = 1200$
At 0mins, count rate $1200 \times 2 = 2400$
Ans. D

14. If light with photon energy 2eV is incident on the surface of a metal with work function 3eV , no electron will be emitted.
The law of photoelectric emission states that for electron to be emitted from the surface of a metal, the photon energy has to be equal to or greater than the work function. **Ans. A**

15. mass, $m = 1.0 \times 10^4 \text{ kg}$
Speed of light, $c = 3.0 \times 10^8 \text{ m/s}$
Energy obtained, $E = mc^2$
 $E = 1.0 \times 10^4 \times (3.0 \times 10^8)^2 = 9.0 \times 10^{19} \text{ J}$
Ans. D

SUMMARY OF ANSWERS

[PHYSICS 2006/2007]

1.B	2.C	3.B	4.B	5.B
6.B	7.A	8.B	9.C	10.B
11.A	12.A	13.D	14.A	15.D

SUCCESS QUOTE

“There is never enough time to do everything, but there is always enough time to do the most important things.”

~Brian Tracy

PHYSICS 2007/2008 QUESTIONS

1. The extension of a spring when 5g weight was hung from it was 0.56cm. If Hooke's law is obeyed, what is the extension caused by a load of 20g weight?
A. 1.12cm B. 2.14cm
C. 2.52cm D. 2.24cm
2. The distance traveled by a particle starting from rest is plotted against the square of the time elapsed from the commencement of motion. The resulting graph is a measure of
A. initial displacement B. initial velocity
C. acceleration D. average velocity
3. A 90cm uniform lever has a load of 30N suspended at 15cm from one of its ends. If the fulcrum is at the centre of gravity, the force that must be applied at its other end to keep it in horizontal equilibrium is
A. 15N B. 20N
C. 30N D. 60N
4. Two points on a velocity-time graph have coordinates (5s, 10m/s) and (20s, 20m/s). Calculate the mean acceleration between the two points.
A. 0.67m/s^2 B. 0.80m/s^2
C. 1.50m/s^2 D. 2.00m/s^2
5. Which of the following statements are correct?
i. Land and sea breezes are natural convection
ii. The vacuum in a thermos flask prevents heat loss due to convection only
iii. Convection may occur in liquids or gases but not in solids
A. i and ii only B. ii and iii only
C. i and iii only D. i, ii and iii only
6. The property of the eye known as its power of accommodation is controlled by the
A. pupil B. vitreous humour
C. iris D. ciliary muscles

7. Under constant tension and constant mass per unit length, the note produced by a plucked string is 500Hz when the length of the wire is 0.9m. At what length is the frequency 150Hz?
A. 3m B. 0.27m
C. 8.33m D. 6740m
8. An object is placed in front of two plain mirrors inclined at an angle of θ° . If the total number of images formed is 7, find the value of θ° .
A. 30° B. 45°
C. 51° D. 90°
9. The north pole of a magnet can never be separated from the south pole because of a property known as
A. magnetic dipole
B. magnetic moment
C. magnetic monopole
D. magnetic quadrupole
10. If the distance between two point charges is increased by a factor of four, the magnitude of electrostatic force between them will be
A. $\frac{1}{4}$ of its initial value
B. $\frac{1}{2}$ of its initial value
C. $\frac{1}{16}$ of its initial value
D. 4 times of its initial value
11. The terminal voltage of a battery is 4.0V when supplying a current of 2.0A; and 2.0V when supplying a current of 3.0A. The internal resistance of the battery is
A. 0.5Ω B. 1.0Ω
C. 2.0Ω D. 4.0Ω
12. The primary aim in high tension transmission is to
A. Minimize electrical energy losses due to heat production
B. Increase the rate of energy transfers by using high voltage
C. Increase the current in the wires

- D. Generate electricity at high current and low voltage
13. Which of the following is required to convert a milliammeter to ammeter?
A. A high resistance in parallel
B. A low resistance in series
C. A low resistance in parallel
D. A high resistance in series
14. A light of energy 5eV falls on a metal and electrons with a maximum kinetic energy of 2eV are ejected. The work function of the metal is
A. 0.4eV B. 2.5eV
C. 3.0eV D. 7.0eV
15. One of the features of fission process is that
A. its products are not radioactive
B. it leads to chain reaction
C. neutrons are not released
D. the sum of the masses of the reactants equals the sum of the masses of the products

BONUS TIP

The Quick Subject Revision Aids in this book are repositories of likely examination questions for UNN post UTME/DE screening. Be wise enough to go through them thoroughly.

PHYSICS 2007/2008 ANSWERS

1. $F \propto e \rightarrow F = ke \rightarrow \frac{F}{e} = k$

This implies that $\frac{F_1}{e_1} = \frac{F_2}{e_2}$

$F_1 = 5g, e_1 = 0.56, F_2 = 20g, e_2 = ?$

$$\frac{5g}{0.56} = \frac{20g}{e_2}$$

$$e_2 = \frac{(20g \times 0.56)}{5g} = 2.24\text{cm}$$

Ans. D

2. In motion, when distance (s) is plotted against the square of time (t^2), the resulting graph is called s-t² graph. The most important property of this graph is that its slope, given by $\Delta s(\text{m})/\Delta t^2(\text{s}^2)$, is a measure of the acceleration of the body in motion.

Ans. C

3. Length of uniform lever = 90cm

If the fulcrum is at the centre of gravity, then the distance between fulcrum and the end of the lever is 45cm.

Let the force applied at the other end be F.

$$\rightarrow 45 \times F = 30 \times 30 = 900$$

$$F = 900/45 = 20\text{N}$$

Ans. B

4. At point A, $v = 10\text{m/s}, t = 5\text{s}$

$$\rightarrow a_A = \frac{v}{t} = \frac{10}{5} = 2\text{m/s}^2$$

At point B, $v = 20\text{m/s}, t = 20\text{s}$

$$\rightarrow a_B = \frac{20}{20} = 1\text{m/s}^2$$

$$\text{mean acceleration} = \frac{(2 + 1)}{2} = 1.5\text{m/s}^2$$

Ans. C

5. Convection is heat transfer as a result of mass transfer, which can be natural or forced. Natural convection cycles occur in liquids and gases. [C]

6. Accommodation is the process by which the vertebrate eye changes optical power to maintain a clear image on an objects as its distance changes. Accommodation acts like a reflex, but can also be consciously controlled. Mammals, birds and reptiles vary the optical power by

changing the form of the elastic lens using ciliary muscles.
Ans. D

7. The frequency of the note produced by a sonometer wire is inversely proportional to the length of the wire provided the tension and the mass per unit length are kept constant.

Mathematically,

$$f \propto \frac{1}{l} \quad (\text{at const. T and M})$$

$$f = \frac{k}{l} \rightarrow f_1 l_1 = k \rightarrow f_1 l_1 = f_2 l_2 \rightarrow l_2 = \frac{f_1 l_1}{f_2}$$

$$f_1 = 500\text{Hz}, l_1 = 0.9\text{m}, l_2 = ?, f_2 = 150\text{Hz}$$

$$l_2 = \frac{500 \times 0.9}{150} = 3\text{m}$$

Ans. A

8. $\left(\frac{360}{\theta}\right) - 1 = n$ Where n is the total number of images formed.

$$\left(\frac{360}{\theta}\right) - 1 = 7$$

$$\left(\frac{360}{\theta}\right) = 7 + 1 = 8$$

$$\theta = \frac{360}{8} = 45^\circ \quad \text{Ans. B}$$

9. Magnetic poles have always been observed to occur in pairs, never singly. Two opposite poles form what is called a magnetic dipole. When a bar magnet is broken, we do not get two single isolated poles. Rather, we get two shorter magnets, each with a north and south pole. **Ans. A**

10. The force between two point charges is inversely proportional to the square of the distance between them, i.e.

$$F \propto \frac{1}{d^2} \rightarrow F = \frac{k}{d^2}$$

where F = force, d = dist. and k = const.

If distance is increased by a factor of four, then

d = 4. This gives

$$F = \frac{k}{4^2} = \frac{k}{16}$$

Therefore, F = $\frac{1}{16}$ of its initial value. **Ans. C**

11. $E - V = Ir$

$$E - 2 = 3r \dots\dots\dots(1)$$

$$E - 4 = 2r \dots\dots\dots(2)$$

Subtracting equation (2) from equation (1)
gives, r = 2Ω

Ans. C

12. The primary aim in high tension transmission is to minimize electrical energy losses due to heat production. For power transmission over long distances, transformers provide a means to increase (step up) the voltage and reduce the current to cut down or minimize the resistive I^2R losses. **Ans. A**

13. A shunt is a resistor of very low resistance that is usually connected in parallel across a galvanometer or a milliammeter in order to convert it to an ammeter. **Ans. C**

$$14. E = W + k.e$$

$$5 = W + 2$$

$$W = 5 - 2$$

$$W = 3.0\text{eV} \quad \text{Ans. C}$$

15. Note the following:

- (i) A chain reaction is a sequence of reactions where a reactive product causes additional reactions to take place.
- (ii) A fissile material is one that is capable of sustaining a chain reaction of nuclear fission.
- (iii) When an atom undergoes nuclear fission, a few neutrons are ejected from the reaction. These free neutrons will then interact with the surrounding medium and if more fissile fuel is present, some may be absorbed and cause more fissions. Thus, the cycle repeats to give a reaction that is self-sustaining. **Ans. B**

SUMMARY OF ANSWERS

[PHYSICS 2007/2008]

1.D	2.C	3.B	4.C	5.C
6.D	7.A	8.B	9.A	10.C
11.C	12.A	13.C	14.C	15.B

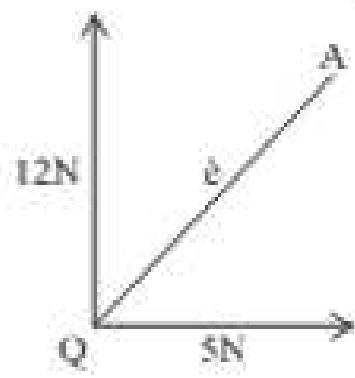
SUCCESS QUOTE

"Never regret your past. Rather, embrace it as the teacher that it is."

~ Robin S. Sharma

PHYSICS 2008/2009 QUESTIONS

1. A body of mass 5kg initially at rest is acted upon by two mutually perpendicular forces 12N and 5N as shown in the figure below.



- If the particle moves in the direction QA, calculate the magnitude of the acceleration.
- A. 2.60 m/s^2 B. 0.26 m/s^2
C. 3.40 m/s^2 D. 1.40 m/s^2
E. 0.40 m/s^2

2. A car of mass 1500kg goes round a circular curve of radius 50m at a speed of 40m/s. The magnitude of centripetal force on the car is

- A. $1.2 \times 10^3 \text{ N}$ B. $1.2 \times 10^5 \text{ N}$
C. $4.8 \times 10^3 \text{ N}$ D. $4.8 \times 10^5 \text{ N}$

3. The efficiency of a machine is always less than 100% because

- A. load lifted is always greater than work input
B. load lifted is always greater than the applied effort
C. effort applied is always greater than mechanical advantage
D. velocity ratio is always greater than the mechanical advantage

4. Which of these statements is not true?

Thermostats are used to control the temperature of

- A. pressure cookers
B. laundry irons
C. hot water storage tanks
D. aquaria for tropical fish

5. A given mass of an ideal gas occupies a volume V at a temperature T and under a pressure P. If the pressure is increased to 2P and the temperature reduced to $1/2T$, then the percentage change in volume of the gas is

- A. 25% B. 75%
C. 300% D. 1%

6. The thermometric property of a constant volume

thermometer is

- A. change in pressure
B. change in length
C. differential expansion
D. change in volume

7. The combination of sound waves with different frequencies is known as

- A. interference B. diffraction
C. superposition D. resonance

8. Which of the following characteristics of a wave is used in the measurement of the depth of the sea?

- A. Refraction B. Reflection
C. Diffraction D. Interference

9. Which of the following eye defects can be corrected using a cylindrical lens?

- A. Astigmatism
B. Presbyopia
C. Chromatic aberration
D. Myopia

10. The resistance of a wire depends on

- A. the length of the wire
B. the area of the wire
C. the temperature of the wire
D. all of the above

11. A dynamo primarily converts

- A. mechanical energy into electrical energy
B. electrical energy into kinetic energy
C. potential energy into kinetic energy
D. kinetic energy into potential energy

12. If a current carrying coil is mounted on a metal frame, the back emf induced in the coil causes

- A. inductance
B. eddy current
C. electromagnetism
D. dipole moment

13. Which of the following may be found in light nuclei?

- i. β -particles
 - ii. protons
 - iii. neutrons
 - iv. α -particles
- A. i and ii only B. i and iii only
C. i and iv only D. ii and iii only

14. The difference between X-rays and γ -rays is that
- A. X-rays arise from energy changes and are due to electrons while γ -rays come from the nucleus
 - B. X-rays are electromagnetic radiations while γ -rays are not
 - C. X-rays have higher frequencies than γ -rays
 - D. X-rays are more penetrating than γ -rays

15. When an atom loses or gains a charge, it becomes
- A. an electron B. an ion
 - C. a neutron D. a proton

SUCCESS QUOTE

Push yourself to do more and to experience more. Harness your energy to start expanding your dreams. Yes, expand your dreams. Don't accept a life of mediocrity when you hold such infinite potential within the fortress of your mind. Dare to tap into your greatness. It's your birthright.

~ Robin Sharma

PHYSICS 2008/2009 ANSWERS

1. Let the resultant of the two mutually perpendicular forces be F.

$$F = \sqrt{12^2 + 5^2} = \sqrt{144 + 25} = 13\text{N}$$

But $F = ma$

$$\Rightarrow a = \frac{F}{m} = \frac{13}{5} = 2.60 \text{ m/s}^2$$

Ans. A

2. $F = \frac{mv^2}{r} = \frac{(1500 \times 40^2)}{50}$

$$F = 48000\text{N} = 4.8 \times 10^4\text{N}$$

Ans. D

3. Mechanical efficiency is basically a measure of what you get out of what you put in - that is, the useful work output for the energy input.

Efficiency is given as a fraction (or percentage):

$$\text{Efficiency} = \frac{W_o}{W_i} \times 100\% \\ V.R$$

Efficiency is always less than 100% because velocity ratio is always greater than mechanical advantage.

Ans. D

4. A thermostat is the component of a control system which regulates the temperature of a system so that the system's temperature is maintained near a desired setpoint temperature. Thermostats are component parts of aquarium heaters, pressure cookers and laundry irons.

Ans. C

5. $\frac{P_1 V_1}{T_1} = \frac{2P_1 V_2}{\frac{1}{2}T_1}$

This relation is gotten from the combined gas law.

It follows that

$$\frac{V_2}{V_1} = \frac{(V_1 \times P_1 \times \frac{1}{2}T_1)}{(T_1 \times 2P_1)} = \frac{V_2}{4}$$

Converting to percentage, we have

$$V_2 = \frac{V_1}{4} \times 100\% = 25\% \text{ of } V_1 \quad \text{Ans. A}$$

6. The relationship that allows a gas to be used to

measure temperature in a constant-volume gas thermometer is that the pressure and volume are directly proportional to temperature: $PV \propto T$. Holding the volume of a gas constant gives $P \propto T$. Thus, with a constant-volume gas thermometer, temperature is read in terms of pressure.

Ans. A

7. With respect to waves, superposition principle posits that the amplitude caused by two or more waves traversing the same space, is the sum of the amplitudes which would have been produced by the individual waves separately. In other words, it is the combining of waves.

Ans. C

8. Depth of the sea is measured by two basic methods: by using the acoustic echo sounders on the ships and by using data from the satellite altimeters. As the name suggests, the echo sounders measure the depth of the sea by using echo of sound as measure. The instrument transmits a 10-30KHz sound that gets reflected from the sea floor. The echo from the sea floor determines the depth of the sea. **Ans. B**

9. Astigmatism can be corrected/reduced by reducing the effective area of the lens with an aperture or by adding a cylindrical lens to compensate.

Ans. A

10. The resistance of a wire is directly proportional to the length of the wire and inversely proportional to its cross-sectional area. The resistance also depends on the temperature of the wire.

Ans. D

11. A dynamo is a machine which transforms mechanical energy to electrical energy. It produces an emf at its terminals by electromagnetic induction.

Ans. A

12. If a current carrying coil is mounted on a metal frame, the back emf induced in the coil causes Eddy Current. Eddy Currents are swirling movements of charge. They are currents induced in conductors, when the conductors are exposed to changing magnetic field due to relative motion of the field source and the conductor; or due to variation of the field with time. **Ans. B**

13. Out of all the particles given in the options, it is only protons and neutrons that may be found in light nuclei. Note that the nuclei of heavier atoms differ from light nuclei by having more neutrons and protons.

Ans. D

14. X-rays and γ -rays are usually distinguished by their origins: X-rays are emitted by electrons outside the nucleus, while γ -rays are emitted by the nucleus.

Ans. A

15. When an atom loses or gains a charge, it becomes an ion. An ion is an atom or molecule in which the total number of electrons is not equal to the total number of protons, giving it a net positive or negative electrical charge.

Ans. B

SUMMARY OF ANSWERS

[PHYSICS 2008/2009]

1.A	2.D	3.D	4.C	5.A
6.A	7.C	8.B	9.A	10.D
11.A	12.B	13.D	14.A	15.B

SUCCESS QUOTE

"Champions aren't made in the gyms. Champions are made from something they have deep inside them - a desire, a dream, a vision."

~ Muhammad Ali

PHYSICS 2009/2010 QUESTIONS

1. A body falls freely under gravity ($g = 9.8 \text{ m/s}^2$) from a height of 10 m on top of a platform 0.8 m above the ground. Its velocity on reaching the platform is
A. 7848 m/s B. 80 m/s
C. 78 m/s D. 27.78 m/s
2. A hydrometer is an instrument used for measuring the
A. depth of water in a vessel
B. relative density of a liquid by method of flotation
C. relative density of a liquid by finding the apparent loss in weight
D. relative humidity of the atmosphere
3. A bead traveling on a straight wire is brought to rest at 0.2 m by friction. If the mass of the bead is 0.01 kg and the coefficient of friction between the bead and the wire is 0.1, determine the work done by friction.
A. $2 \times 10^{-4} \text{ J}$ B. $2 \times 10^{-3} \text{ J}$
C. $2 \times 10^1 \text{ J}$ D. $2 \times 10^2 \text{ J}$
4. A machine whose efficiency is 60% has a velocity ratio of 5. If a force of 500N is applied to lift a load of P(N), what is the magnitude of P?
A. 750N B. 4166N
C. 500N D. 1500N
5. A mass of gas at 7°C and 70cm of mercury has a volume of 1200cm^3 . Determine its volume at 27°C and a pressure at 75cm of mercury.
A. 1200cm^3 B. 1378cm^3
C. 4320cm^3 D. 4629cm^3
6. A motor tyre is inflated to a pressure of $2.0 \times 10^5 \text{ Nm}^{-2}$ when the temperature of air is 27°C . What

- will be the pressure at 87°C assuming the volume does not change?
A. $2.6 \times 10^5 \text{ Nm}^{-2}$ B. $2.4 \times 10^5 \text{ Nm}^{-2}$
C. $2.2 \times 10^5 \text{ Nm}^{-2}$ D. $1.3 \times 10^5 \text{ Nm}^{-2}$
7. A beam of light is incident from air to water at an angle of 30° . Find the angle of refraction if the refractive index of water is $4/3$.
A. 15° B. 18°
C. 22° D. 240°
8. The wavelength of signal from a radio transmitter is 1500m and the frequency is 200KHz. What is the velocity of the propagation?
A. $3 \times 10^8 \text{ ms}^{-2}$ B. $7 \times 10^1 \text{ ms}^{-2}$
C. $3 \times 10^1 \text{ ms}^{-2}$ D. 7 ms^{-2}
9. A boy on looking into a mirror discovers that his face appeared to have grown bigger. The boy must have been looking at a
A. convex mirror with his face at the focus
B. concave mirror with his face between the focus and the mirror
C. convex mirror with his face between the focus and the mirror
D. concave mirror with his face at the focus
10. Find the frequencies of the first three harmonics of a piano string of length 1.5m, if the velocity of the string is 120m/s.
A. 40Hz, 80Hz, 120Hz
B. 180Hz, 360Hz, 540Hz
C. 80Hz, 160Hz, 240Hz
D. 360Hz, 180Hz, 90Hz
11. The resistance of a piece of wire of length 20 cm and cross-sectional area $8 \times 10^{-5} \text{ m}^2$ and resistivity $4 \times 10^{-7} \Omega\text{m}$ is
A. 1.0Ω B. 10.0Ω
C. 400.0Ω D. $1.0 \times 10^{-13} \Omega$

12. An electric device is rated 2000W, 250V. The correct fuse rating of the device is

- A. 8A B. 9A
C. 7A D. 6A

13. Determine the inductive reactance when a 30.0mH inductor with negligible resistance is connected to a 1.3KHz oscillator

- A. 39.0Ω B. 122.5Ω
C. 245.0Ω D. 39KΩ

14. The half-life of a radioactive element is 9days. Calculate the fraction that remains after 36days.

- A. 1/32 B. 1/16
C. 1/4 D. 15/32

15. The graphite rods surrounding the uranium fuel rods in a nuclear reactor are used to

- A. absorb the neutrons and hence halt the nuclear process
B. create the neutrons and hence slow down the nuclear process
C. slow down the neutrons and hence slow down the nuclear process
D. speed up the neutrons and hence speed up the nuclear process

DON'T FORGET

SURE SUCCESS is more than just a book. It's a Divine Project. Don't fall into the temptation of photocopying or preparing with a photocopy of the book. You may be sowing the seed for your frustration in life.

PHYSICS 2009/2010 ANSWERS

1. Since the body started falling from a height of 10m above the platform, and the required velocity is the velocity on reaching the platform, the height of the platform above the ground is not important.

$$v^2 = u^2 + 2gs$$

where $u = 0$, $g = 9.8\text{m/s}^2$, $s = 10\text{m}$

$$v^2 = 2 \times 9.8 \times 10 = 196$$

$$v = \sqrt{196} = 14\text{m/s}$$

2. A hydrometer is an instrument used to measure the specific gravity (or relative density) of liquids; that is, the ratio of the density of the liquid to the density of water. This should not be confused with hygrometer (which is an instrument used for measuring the moisture content in the environmental air, or humidity). Ans. B

3. $s = 0.2\text{m}$, $m = 0.01\text{kg}$, $\mu = 0.1$, $W = ?$
 $g = 9.8\text{m/s}^2$.

$W = Fs$, where $F = \mu R = \mu mg$

$$F = 0.1 \times 0.01 \times 9.8 = 9.8 \times 10^{-3}\text{N}$$

$$W = 9.8 \times 10^{-3} \times 0.2 \approx 2 \times 10^{-3}\text{J}$$

Ans. B

4. $\xi = \frac{(L/E)}{(VR)} \times 100\%$

$$\frac{60}{100} = \frac{(P/500)}{5} = \frac{P}{(5 \times 500)}$$

$$P = \frac{(60 \times 5 \times 500)}{100}$$

$$P = 1500\text{N}$$

Ans. D

5. Converting the given temperatures from degree Celsius to Kelvin, we have that

$$t(\text{°C}) + 273 = T(\text{K}), 7\text{°C} + 273 = 280\text{K}$$

$$27\text{°C} + 273 = 300\text{K}$$

$$\frac{(P_1V_1)}{T_1} = \frac{(P_2V_2)}{T_2} \rightarrow \frac{(70 \times 1200)}{280} = \frac{(75 \times V_2)}{300}$$

$$V_2 = \frac{(70 \times 1200 \times 300)}{(280 \times 75)}$$

$$V_2 = 1200\text{cm}^3 \quad \text{Ans. A}$$

6. Note that the pressure of a gas at constant volume is directly proportional to its absolute temperature. This implies that,

$$\frac{P}{T} = \text{constant} \quad \text{or} \quad \frac{P_1}{T_1} = \frac{P_2}{T_2}$$

From the question, $P_1 = 2.0 \times 10^5 \text{ N/m}^2$,

$T_1 = 27^\circ\text{C} = 300\text{K}$, $P_2 = ?$, $T_2 = 87^\circ\text{C} = 360\text{K}$

$$\frac{(2.0 \times 10^5)}{300} = \frac{P_2}{360}$$

$$P_2 = \frac{(2.0 \times 10^5 \times 360)}{300}$$

$$P_2 = 240000 = 2.4 \times 10^5 \text{ N/m}^2$$

Ans. B

7. $(\sin 30)/\sin r = \frac{3}{4}$

$$\sin r = \frac{3}{4} \sin 30 = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$$

$$r = \sin^{-1}(\frac{3}{8}) = 22^\circ \quad \text{Ans. C}$$

8. $\lambda = 1500\text{m}$, $f = 200\text{KHz} = 200\ 000\text{Hz}$,

$$v = ?$$

$$v = f\lambda = 200\ 000 \times 1500 = 300\ 000\ 000$$

$$v = 3 \times 10^8 \text{ m/s} \quad \text{Ans. A}$$

9. Note that for a convex mirror, regardless of the position of the object, the image formed is always virtual, erect and diminished.

For concave mirrors, when an object is placed at the focus, the image formed is at infinity. But when an object is placed between the focus and the mirror (or the pole), the image formed is virtual, erect and magnified. Ans. B

10. For a piano string, we note that the vibrating length (l) of the first harmonic is

$$l = \frac{\lambda}{2}, \text{ so that } \lambda = 2l.$$

The frequency of the first harmonic,

$$f_1 = \frac{v}{\lambda} = \frac{v}{2l}$$

Also, $f_2 = 2f_1$, $f_3 = 3f_1$.

where f_1 and f_2 are frequencies of the 2nd and 3rd harmonics respectively. From the question, $l = 1.5\text{m}$, $v = 120\text{m/s}$. Using that, we obtain

$$f_1 = 40\text{Hz}, f_2 = 80\text{Hz}, f_3 = 120\text{Hz}. \quad \text{Ans. A}$$

$$11. R = \frac{(pl)}{A} = \frac{(4 \times 10^7 \times 0.2)}{(8 \times 10^3)}$$

$$R = 1.0 \times 10^{13} \Omega$$

Ans. D

$$12. P = IV, I = P/V$$

$$I = 2000/250 = 8\text{A}$$

Ans. A

$$13. X_L = ?, L = 30\text{mH} = 30 \times 10^{-3}\text{H},$$

$$f = 1.3\text{KHz} = 1.3 \times 1000\text{Hz}$$

$$X_L = 2\pi \times 1.3 \times 1000 \times 30 \times 10^{-3}$$

$$X_L = 245.0\Omega$$

Ans. C

14. Let,

N_0 = the original number of nuclei

N = the number of nuclei left after time, t .

$T_{1/2}$ = half-life = 9days

t = time = 36days

The fraction left is given by

$$N/N_0 = (\frac{1}{2})^{t/T_{1/2}} = (\frac{1}{2})^{36/9} = \frac{1}{16} \quad \text{Ans. B}$$

15. In nuclear reactors, nuclear fission occurs with the atoms of atomic weight 235 when uranium is used. Fission takes place only if the bombarding neutron is slow. Graphite is therefore used round the uranium to slow down the neutron, so that the chain reaction is prevented from dying out.

Ans. C

SUMMARY OF ANSWERS

[PHYSICS 2009/2010]

1.	2.B	3.B	4.D	5.A
6.B	7.C	8.A	9.B	10.A
11.D	12.A	13.C	14.B	15.C

SUCCESS QUOTE

"If you can imagine it, you can achieve it."

If you can dream it, you can become it."

- William Arthur Ward

PHYSICS 2010/2011 QUESTION(Day 1)

1. Two forces whose resultant is 100N are at right angles to each other. If one of them makes an angle of 30° with the resultant, find the magnitude of the other force.
A. 8.66N B. 86.6N C. 50.0N D. 5.0N
2. A body of weight W N rests on a smooth plane inclined at an angle θ° to the horizontal. The component of the weight down the slope is
A. $W\sin\theta$ B. $W\cos\theta$ C. $W\tan\theta$ D. $W\sec\theta$
3. A body of mass 100g moves with a velocity of 10.0ms^{-1} and collides with a wall. After the collision, the body moves with a velocity of 2.0ms^{-1} in the opposite direction. The change in momentum is
A. 8.0Ns B. 1.2Ns C. 12.0Ns D. 80Ns
4. A 12V battery supplying a current of 20A was used to melt 1.5kg of ice at 0°C . Calculate the time required if the latent heat of fusion of ice is $336 \times 10^3\text{J/Kg}$.
A. 35.0min B. 3.5min C. 76min D. 21.0min
5. The light from the sun reaches the earth mainly by
A. convection B. conduction C. radiation D. reflection
6. One valid assumption of the kinetic theory of gases is that
**A. the molecules are in random motion and the number of collisions is constant
B. the number of molecules increases with the pressure
C. the molecules of the gas are all identical and are very small in size
D. the number of molecules increases with temperature**
7. An astronomical telescope is said to be in normal adjustment when the
**A. eye is accommodated
B. focal length of objective lens is longer than that of the eye piece
C. final image is at the near point of the eye
D. final image is at infinity**
8. Dispersion of light by a glass prism is due to the
A. different hidden colours of the glass
9. different speeds of the various colours in glass
**C. defects in the glass
D. high density of glass**
10. A guitar string of length 33cm is under a tension of 55N. If the fundamental frequency is 196Hz, find the speed of wave on string.
**A. 6m/s B. 0.33m/s
C. 129m/s D. 726m/s**
11. A transformer has 400 turns as its primary winding and 100 turns as secondary winding. If the primary coil is connected to a 12V source, the transformer functions as
**A. a step down transformer with secondary emf = 6V
B. a step down transformer with secondary emf = 3V
C. a step up transformer with secondary emf = 24V
D. a step up transformer with secondary emf = 48V**
12. A battery of internal resistance of 2Ω has a voltage of 4.0V when supplying a current of 2.0A. Calculate the terminal voltage if it now supplies a current of 3.0A.
A. 2.0V B. 6.0V C. 1.5V D. 12.0V
13. The purpose of a dielectric material in a parallel plate capacitor is to
**A. increase its capacitance
B. decrease its capacitance
C. insulate the plates from each other
D. increase the magnetic field between them**
14. The name of an atom is associated with its atomic number Z, mass number A and neutron number N. Therefore:
**A. $A = Z + N$ B. $Z = A + N$
C. $N = A + Z$ D. $A = N \cdot Z$**
15. A nuclear reaction initiated by adding neutron is called
**A. nuclear fission B. nuclear fusion
C. nuclear enrichment D. radioactivity**
16. The mass defect resulting from a thermonuclear reaction is $9.8 \times 10^{-30}\text{Kg}$. Calculate the energy released. Take $c = 3 \times 10^8\text{m/s}$.
**A. $2.94 \times 10^{-22}\text{J}$ B. $8.82 \times 10^{-22}\text{J}$
C. $8.82 \times 10^{-24}\text{J}$ D. $8.82 \times 10^{-12}\text{J}$**

PHYSICS 2010/11 ANSWERS [Day 1]

1. Let the magnitude of the other force be F.

$$\sin 30 = F/100$$

$$F = 100 \sin 30 = 100 \times 0.5 = 50\text{N}$$

Ans. C

2. When a body of weight WN rests on a smooth plane inclined at an angle θ° to the horizontal, the normal reaction of the plane on the body is given by $WCos\theta$ while the component of the weight down the slope is $W\sin\theta$. **Ans. A**

3. Recall that momentum is simply defined as the product of mass and velocity of a body in motion. Change in momentum is otherwise referred to as impulse.

Impulse = change in momentum

= final momentum - initial momentum

$$= mv - mu = m(v - u)$$

$$\text{But } m = 100\text{g} = 0.1\text{Kg}, u = 10\text{m/s}, v = -2\text{m/s}$$

$$\text{Impulse} = 0.1[10 - (-2)] = 0.1 \times 12$$

$$= 1.2\text{Kgm/s} \quad \text{Ans. B}$$

4. $V = 12\text{V}$, $I = 20\text{A}$, $m = 1.5\text{kg}$, $t = ?$,

$$c = 336 \times 10^3 \text{J/Kg.}$$

$$mc = VIt$$

$$t = \frac{mc}{IV} = \frac{(1.5 \times 336 \times 10^3)}{(20 \times 12)}$$

$$t = 2100\text{secs} = (2100/60)\text{mins.}$$

$$t = 35\text{mins}$$

Ans. A

Compare with Question No 4 of year 2006/2007.

5. Conduction and convection require some material as a transport medium. Radiation, which refers to energy transfer by electromagnetic waves, needs no medium. Light energy from the sun is transferred to the earth through empty space by radiation. **Ans. C**

6. One essential postulate of kinetic theory of ideal gases is that every gas consists of a very large number of tiny particles called molecules.

Molecules of the same gas are identical in all respects i.e. they have the same mass, shape and size but differ from molecules of another gas.

Ans. C

7. The astronomical telescope is an instrument used for viewing distant objects, such as the stars and other planets. It consists of two converging lenses mounted so that they have the same axis. The lenses can be arranged so that the final image is at infinity. In such an arrangement the principal focus of the objective must coincide with that of the eye-piece. In this arrangement, the telescope is said to be in normal adjustment.

Ans. D

8. Note that visible light, also known as white light, consists of a collection of component colours. These colours are often observed as light passes through a triangular prism. Upon passage through the prism, the white light is separated into its component colours-red, orange, yellow, green, blue, indigo, violet. The separation of visible light into its different colours is known as dispersion. Dispersion is due to the different speeds that the component colour rays move in glass prism.

Ans. B

Compare with Question No 8 of year 2006/2007.

$$f_o = v/2l$$

$$196 = v/(2 \times 0.33)$$

$$v = 196 \times 2 \times 0.33 = 129.36\text{m/s}$$

Ans. C

$$10. 400\text{turns} = 12\text{V},$$

$$100\text{turns} = (100 \times 12)/400 = 3\text{V}$$

Ans. B

$$11. \text{From } V = Ir, \frac{V}{r} = I \text{ where } r = \text{constant.}$$

$$\rightarrow \frac{V_1}{r_1} = \text{constant or } \frac{V_1}{r_1} = \frac{V_2}{r_2}$$

$$\frac{4}{2} = \frac{V_2}{3}$$

$$V_2 = \frac{(4 \times 3)}{2} = 6V$$

Ans. B

12. Note that an insulating material which has the effect of increasing the capacitance of a vacuum-filled parallel plate capacitor, when it is inserted between its plates, is called a dielectric material, and the factor by which the capacitance is increased is called the dielectric constant of the material.

Ans. A

Compare with Question No 12 of year 2006/2007

13. The proton and the neutron form the nucleus of the atom and give the atom its mass. Hence,

$$A = Z + N$$

Ans. A

14. In nuclear physics, nuclear fission is a nuclear reaction in which the nucleus of an atom splits into smaller parts (lighter nuclei), often producing free neutrons and protons, and releasing a tremendous amount of energy.

Nuclear fission is usually induced by a neutron, although it is occasionally seen as a form of spontaneous radioactive decay.

Ans. A

$$\begin{aligned}15. E &= mc^2 = 9.8 \times 10^{-30} \times (3 \times 10^8)^2 \\&= 9.8 \times 10^{-30} \times 9 \times 10^{16} \\&= 9.8 \times 9 \times 10^{-30} \times 10^{16} = 88.2 \times 10^{-14} \\&= 8.82 \times 10^{-11}\end{aligned}$$

Ans. D

SUMMARY OF ANSWERS

[PHYSICS 2010/2011 (Day 1)]

1.C	2.A	3.B	4.A	5.C
6.C	7.D	8.B	9.C	10.B
11.B	12.A	13.A	14.A	15.D

SUCCESS QUOTE

"A man, as a general rule, owes very little to what he is born with - a man is what he makes of himself."

- Alexander Graham Bell

PHYSICS 2010/11 QUESTION [Day 2]

1. Which of the following statements is true of the period of a simple pendulum?

- A. it depends on the mass of the bob and the acceleration due to gravity
- B. it depends on the length of the string and the acceleration due to gravity
- C. it depends on the mass of the bob and the length of the string
- D. it depends on the mass of the bob, the length of the string and acceleration due to gravity

2. A boat travels due east with a speed of 40ms^{-1} across a river flowing due south at 30ms^{-1} . Calculate the resultant speed of the boat.

- A. 1.3ms^{-1}
- B. 10.0ms^{-1}
- C. 50.0ms^{-1}
- D. 70.0ms^{-1}

3. The atmospheric pressure due to water is $1.3 \times 10^5 \text{Nm}^{-2}$. What is the total pressure at the bottom of an ocean 10m deep? (Density of water = 1000kgm^{-3} and $g=10 \text{ ms}^{-2}$)

- A. $1.3 \times 10^7 \text{Nm}^{-2}$
- B. $1.4 \times 10^6 \text{Nm}^{-2}$
- C. $1.4 \times 10^5 \text{Nm}^{-2}$
- D. $1.0 \times 10^5 \text{Nm}^{-2}$

4. Which of the following conditions will make water boil at a temperature of 100°C and saturation vapour pressure of 750mmHg?

- A. decrease the external pressure
- B. heat more rapidly at the same pressure
- C. increase the external pressure
- D. reduce the quantity of water

5. The density of a fixed mass of gas at constant pressure is

- A. constant with temperature
- B. directly proportional to the temperature
- C. inversely proportional to the temperature
- D. directly proportional to its volume

6. Which of the following equations is incorrect about an ideal gas (all the symbols have their usual meanings)

- A. $PV = nRT$
- B. $PV/T = \text{constant}$
- C. $PV = 3/2nRT$
- D. $TV/P = \text{constant}$

7. The equation of a wave traveling along the positive x-direction is given by $y = 0.20\sin(500t - 20x)$. The amplitude, angular frequency and wavelength of the wave are respectively given by
- 0.2cm, 500rad/s, 20cm
 - 0.2cm, 500rad/s, 0.1π cm
 - $0.2\text{cm}, 2 \times 10^3 \text{rad/s}, 0.1\pi\text{cm}$
 - 5cm, $2 \times 10^3 \text{rad/s}, 0.05\text{cm}$
8. When a plane mirror at which a ray of light is incident is rotated through an angle θ , the reflected ray will be rotated through
- $1/2\theta$
 - θ
 - 2θ
 - 3θ
9. The quality of sound depends on its
- frequency
 - wavelength
 - velocity
 - harmonics
10. The resistance of a piece of wire of length 20m and cross sectional area $8 \times 10^{-6} \text{ m}^2$ has a resistance of 1Ω . The resistivity of the wire is
- $3 \times 10^7 \Omega/\text{m}$
 - $4 \times 10^7 \Omega/\text{m}$
 - $1.6 \times 10^{-5} \text{ m}^2$
 - $4 \times 10^5 \Omega/\text{m}$
11. In an AC circuit that contains only a capacitor, the voltage
- leads the current by 90°
 - lags behind the current by 90°
 - leads the current by 180°
 - lags behind the current by 180°
12. The angle between the direction of the earth's magnetic field and the horizontal is called
- angle of deviation
 - magnetic declination
 - magnetic meridian
 - angle of dip
13. Which of these statements is not correct concerning atomic structure?
- negatively charged electrons orbit the positively charged nucleus
 - electromagnetic forces bind the electrons to the nucleus
 - protons and neutrons have approximately equal mass
- D. the number of electrons orbiting the nucleus is equal to the number of nucleons
14. The half-life of a radioactive element is 9days. Calculate the fraction that remains after 36days.
- $1/32$
 - $1/16$
 - $1/4$
 - $15/32$
15. One of the features of the fission process is that
- it leads to chain reaction
 - its products are not radioactive
 - neutrons are not released
 - mass and energy are conserved

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 - 0.2cm, 500rad/s, 0.1π cm
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 - 5cm, $2 \times 10^3 \text{rad/s}, 0.05\text{cm}$
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PHYSICS 2010/2011 ANSWER [Day 2]

1. In a simple pendulum, the period is given by $T = 2\pi [\sqrt{l/g}]$, where l is the length of the string and g is the acceleration due to gravity.

Ans. B

2. Let the resultant speed be R .

$$R = \sqrt{(40^2 + 30^2)} = \sqrt{2500} = 50\text{m/s.}$$

Ans. C

3. Total pressure = atmospheric pressure +
pressure due to depth of ocean.
= atm. pressure + ρgh
= $1.3 \times 10^5 + (1000 \times 10 \times 10)$
= $1.4 \times 10^5 \text{ Nm}^{-2}$

Ans. B

4. Generally, a liquid boils at the temperature at which its saturation vapour pressure is equal to the external pressure. At standard atmospheric pressure, 760mmHg, water boils at 100°C. For water to boil at a temperature of 100°C and saturation vapour pressure of 750mmHg, the external pressure must be decreased.

Ans. A

5. Note that with respect to gas, pressure and temperature are directly related. That is to say, as pressure increases, temperature increases. This is deduced from the ideal gas law:

$$PV = nRT \dots\dots\dots(1)$$

Where P is pressure and T is temperature. Also, Density is:

$$D = \frac{M}{V} \dots\dots\dots(2)$$

Where M is mass and V is volume. From (2),

$$V = \frac{M}{D} \dots\dots\dots(3)$$

Plug (3) into (1) above:

$$\frac{PM}{D} = nRT$$

So the D is on the bottom and therefore is inversely proportional to both temperature and pressure. In other words, as temperature and/or pressure go up, the density will go down, and vice versa. Note that if either of temperature or pressure is kept constant, the inverse proportionality will still hold.

Ans. C

6. Recall the following:

(A.) The Pressure law:

$$\text{Pressure} = \text{constant} \times \text{Temperature}$$

(B.) Charles law:

$$\text{Volume} = \text{constant} \times \text{Temperature}$$

(C.) The combined gas law:

(A) and (B) above are combined into one law:

$$\frac{PV}{T} = \text{constant}$$

(D.) The ideal gas law (equation):

$$PV = nRT$$

(E.) For noble gases (He, Ne, Ar, Kr, Xe, Rn):

$$PV = \frac{3}{2}nRT$$

2

Ans. D

7. Given: $y = 0.20\sin(500t - 20x)$

Comparing the given wave equation with the standard wave equation:

$$y = A\sin(\omega t - 2\pi x/\lambda)$$

we have that:

$$\Delta = 0.20\text{cm}, \omega t = 500t \rightarrow \omega = 500\text{rad/s}$$

$$(2\pi x)/\lambda = 20x \rightarrow 2\pi/\lambda = 20$$

$$\rightarrow \lambda = 2\pi/20 = 0.1\pi$$

Ans. B

8. When a fixed incident light ray is normal to a plane mirror, it is reflected back the way it came. However, if the mirror is tilted through an angle, then the angle of the reflected light ray is twice the angle through which the mirror is tilted.

Ans. C

9. The quality of a tone is the characteristic that enables it to be distinguished from another of basically the same intensity and frequency. Tone quality is determined by the harmonics (overtones) present in the given tone.

Ans. D

10. Resistivity, $\rho = R\Delta/l = (1 \times 8 \times 10^8)/20$
 $= 4 \times 10^7 \Omega\text{m}$

Ans. B

11. Note the following:

(I.) Pure Capacitive AC circuit: capacitor voltage lags capacitor current by 90°.

(II.) Pure Inductive AC circuit: inductive voltage leads inductive current by 90°.

(III.) Pure Resistive AC circuit: voltage and current are in phase.

Ans. B

Compare with Question No 11 of year 2006/07

12. Magnetic declination is the angle between magnetic north and true north while magnetic inclination (or angle of dip) is the angle between the horizontal plane and the total field vector, measured positive into earth. Ans. D

13. Note that the particles inside the nucleus are called nucleons. It is believed that the nucleus of an atom is built up of protons and neutrons, though other particles have been discovered in the nucleus. The number of electrons orbiting the nucleus cannot be equal to the number of nucleons. Rather, it is equal to the number of protons.

Ans. D

14. Let,

N_0 = the original number of nuclei

N = the number of nuclei left after time, t .

$T_{\frac{1}{2}}$ = half-life = 9days

t = time = 36days

The fraction left is given by

$$N/N_0 = (\frac{1}{2})^{t/T_{\frac{1}{2}}} = (\frac{1}{2})^{36/9} = 1/16$$

Ans. B

15. Nuclear fission is an extremely complex reaction representing a cataclysmic division of an atomic nucleus into two nuclei of comparable mass. This division of heavy nuclei may take place naturally (spontaneous fission) or under bombardment with neutrons, charged particles, gamma rays, or other carriers of energy (induced fission).

Nuclear fission also releases two or more free neutrons. The free neutrons can bombard other nuclei, leading to a series of fissions called a chain reaction.

Ans. A

SUMMARY OF ANSWERS

[PHYSICS 2010/11 (Day 2)]

1.B	2.C	3.B	4.A	5.C
6.D	7.B	8.C	9.D	10.B
11.B	12.D	13.D	14.B	15.A

SUCCESS QUOTE

“For I know the thoughts and plans that I have for you, declares the Lord, thoughts and plans for your welfare, peace and prosperity and not for evil, to give you a future and hope in your final outcome.”

-Jeremiah 29:11

PHYSICS 2011/2012 QUESTIONS

- Two stones P and Q of different masses were projected horizontally at different angles of 15° and 75° respectively but with the same velocity. The ranges covered by the stones will be
 - A. greater for P
 - B. greater for Q
 - C. same for P and Q
 - D. greater for the heavier of the two stones
- If the torque on a body is zero, the angular momentum of the body will
 - A. decrease continuously to zero
 - B. increase then decrease to zero
 - C. be constant
 - D. increase continually
- For which of the following quantities is the derived unit ML^2T^{-2} correct?
 - I. Moment of force II. Acceleration
 - III. Work IV. Momentum
 - A. I and II B. I and III
 - C. III and IV D. II only
- In which of the following are the substances arranged in the descending order of their conductivities?
 - A. copper, steel, glass
 - B. steel, copper, glass
 - C. copper, glass, steel
 - D. glass, copper, steel
- The linear expansivity of brass is $2 \times 10^{-5}/^\circ C$; the volume of a piece of brass 10 cm^3 at $0^\circ C$, what will be its volume at $100^\circ C$?
 - A. 10.02 cm^3
 - B. 10.04 cm^3
 - C. 10.06 cm^3
 - D. 10.20 cm^3
- The thermometric property of the thermocouple is that its
 - A. emf changes with temperature
 - B. resistance changes with temperature
 - C. volume changes with temperature
 - D. resistance changes with length
- A concave lens of focal length 20 cm forms an image $\frac{1}{2}$ the size of the object. The object distance is
 - A. 100 cm
 - B. 30 cm
 - C. 60 cm
 - D. 40 cm
- The quality of sound depends on
 - A. frequency
 - B. wavelength
 - C. velocity
 - D. harmonics

9. A student with a sight defect has a least distance of distinct vision of 150 cm. For him to read a material placed at a distance of 25 cm, what is the focal length of the glasses he should wear?
- A. 15.0 cm B. 17.0 cm
C. 21.4 cm D. 30.0 cm
10. A dynamo primarily converts
- A. mechanical energy into electrical energy
B. electrical energy into kinetic energy
C. potential energy into kinetic energy
D. kinetic energy into potential energy
11. Three capacitors $2\mu F$, $3\mu F$ and $6\mu F$ are connected in series. If the pd across the system is 12V, the pd across the $6\mu F$ capacitor is
- A. 4V B. 6V
C. 12V D. 2V
12. A current of $0.5A$ flows through a resistor when connected to a 40V battery. The energy dissipated in 2 minutes is
- A. 1200J B. 1500J
C. 2400J D. 9600J
13. Which of the following is most strongly deflected by a magnetic field?
- A. γ -rays B. X-rays
C. β -rays D. α - rays
14. The major difference between a semiconductor and a pure metal is that
- A. metals are harder than semiconductors
B. the resistance of metals decreases with temperature while the reverse is the case with semiconductors
C. the resistance of metals increases with temperature while the reverse is the case with semiconductors
D. metals have forbidden band gaps while semiconductors do not have
15. A light of energy 5 eV falls on a metal and the electrons with a maximum kinetic energy of 2 eV are ejected. The work function of the metal is
- A. 0.4eV B. 2.5 eV
C. 3.0 eV D. 7.0 eV

SUCCESS QUOTE "With God, all things are possible."
~The book of Matthew

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PHYSICS 2011/2012 ANSWERS

1. For projectiles with a given initial speed, the maximum range is ideally attained with a projection angle of 45° . For projection angles above or below 45° , the range is shorter, and it is equal for angles equally different from 45° (for example 30° and 60° , 15° and 75° , etc).
- Ans. C
2. This question is about the principle of conservation of angular momentum which states that if the net torque on a system is zero, the total angular momentum is constant. Ans. C
3. Work and moment of force are both obtained as the product of force and distance, i.e.
$$\text{force} \times \text{distance} = mg \times d = \text{kg} \cdot \text{ms}^{-2} \cdot \text{m}$$
$$= \text{kg} \cdot \text{m}^2 \cdot \text{s}^{-2} = \text{ML}^2\text{T}^{-2}$$
- Ans. B
4. The order of descending conductivity of metals is given thus: silver (pure), copper (pure), gold (pure), aluminium, zinc, nickel, brass, bronze, iron (pure), platinum, steel (carbonized), lead (pure), stainless steel.
- Ans. A

5. $a = 2 \times 10^{-3}/^\circ\text{C}$, $v_1 = 10\text{cm}^3$, $v_2 = ?$, $\theta_1 = 0^\circ\text{C}$,
 $\theta_2 = 100^\circ\text{C}$.

Volume expansivity, $\gamma = \frac{v_2 - v_1}{v_1(\theta_2 - \theta_1)}$ (*)

But $\gamma = 3a = 3 \times 2 \times 10^{-3} = 6 \times 10^{-3}$

From (*), $v_2 = \gamma v_1 (\theta_2 - \theta_1) + v_1$
 $= 6 \times 10^{-3} \times 10 \times (100 - 0) + 10$
 $= 10.06\text{cm}^3$

Ans. C

6. The thermometric property of the thermocouple is that its emf changes with temperature causing current to flow.
- Ans. A

7. $f = 20\text{cm}$, $v = \frac{1}{2}u$ or $u = 2v$.

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$
$$\frac{1}{20} = \frac{1}{2v} + \frac{1}{v}$$
$$\frac{1}{20} = \frac{1+2}{2v}$$
$$2v = 60, v = 30$$

Ans. B

8. The quality of a sound depends on the number of harmonics produced and their relative intensities.
- Ans. D

Compare with Question No 9 of 2010/2011 (day 2)

9. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

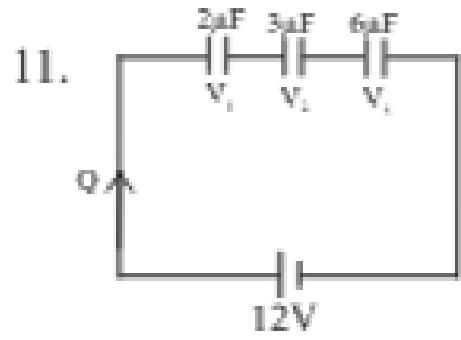
$$\frac{1}{f} = \frac{v+u}{uv}$$

$$f = \frac{uv}{v+u} = \frac{15 \times 150}{150 + 25} = 21.43\text{cm}$$

Ans. C

10. A dynamo primarily converts mechanical energy into electrical energy. Ans. A

Compare with Question No 11 of 2008/2009



$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

$$\frac{1}{C} = \frac{1}{2} + \frac{1}{3} + \frac{1}{6} = 1$$

$$\rightarrow C = 1\mu\text{F}$$

But $Q = CV = 1 \times 12 = 12\text{C}$

$$V = \frac{Q}{C}$$

$$V_s = \frac{Q}{C_s} = \frac{12}{6} = 2\text{V}$$

Ans. D

12. $I = 0.5\text{A}$, $V = 40\text{V}$, $E = ?$, $t = 2\text{min}$

Energy = $Vi t$

$$= 40 \times 0.5 \times (2 \times 60)$$

$$= 2400\text{J}$$

Ans. C

13. Of all the options, β-rays is most strongly deflected by a magnetic field because it is very light and negatively charged. Ans. C

14. A semiconductor is a material which has electrical conductivity between that of a conductor such as copper and an insulator such as glass. The conductivity of a semiconductor increases (i.e. resistance decreases) with increasing temperature while the reverse is the case with metals. Ans. C

15. $E = W + k.e$

$$5 = W + 2$$

$$W = 5 - 2 = 3.0\text{eV}$$

Ans. C

SUMMARY OF ANSWERS

[PHYSICS 2011/2012]

1.C	2.C	3.B	4.A	5.C
6.A	7.B	8.D	9.C	10.A
11.D	12.C	13.C	14.C	15.C

PHYSICS 2012/2013 QUESTIONS

1. The force on a current carrying conductor in a magnetic field is greatest when the
 A. conductor makes an angle of 60° with the field
 B. force is independent of the angle between the conductor and the field
 C. conductor is parallel with the field
 D. conductor is at right angles with the field
2. A magnetic field is said to exist at a point if a force is
 A. exerted on a stationary charge at that point
 B. exerted on a moving charge at that point
 C. deflected at that point
 D. strengthened at that point
3. In an a.c circuit that contains only a capacitor, the voltage lags behind the current by
 A. 90° B. 180° C. 30° D. 60°
4. The particle emitted when ^{40}K decays to ^{40}Ar is
 A. gamma B. beta C. electron D. alpha
5. The particle and wave nature of matter is demonstrated by
 A. Bragg's equation
 B. de Broglie equation
 C. Schrodinger equation
 D. Pauli's exclusive principle
6. The ray which causes gas molecules to glow is
 A. cathode ray B. anode ray
 C. molecular ray D. gamma ray
7. If the distance between two suspended masses 10 Kg each is tripled, the gravitational force of attraction between them is
 A. reduced by one-half
 B. increased by one-third
 C. decreased by one-third
 D. decreased by one-ninth
8. If the radius of the earth is $6.4 \times 10^6\text{m}$, the escape velocity of a satellite from the earth is.... (take $g=10\text{ms}^{-2}$)
 A. $1.13 \times 10^4\text{ms}^{-1}$ B. $9.00 \times 10^3\text{ms}^{-1}$
 C. $8.00 \times 10^3\text{ms}^{-1}$ D. $1.27 \times 10^4\text{ms}^{-1}$

9. If a body of mass 5 Kg is thrown vertically upwards with a velocity U , at what height will the potential energy equal to the kinetic energy?
- A. $h = \frac{U^2}{g}$ B. $h = \frac{U^2}{4g}$
C. $h = \frac{2U^2}{g}$ D. $h = \frac{U^2}{2g}$
10. The rate of heat loss by a body is proportional to the
A. difference in temperature between the body
and its surrounding
B. temperature of its surrounding
C. ratio of the temperature of the body to that of
the surrounding
D. temperature of the body
11. In a gas experiment, the pressure of the gas is plotted against the reciprocal of the volume of the gas at constant temperature, the unit of the slope of the resulting curve is
A. force B. temperature
C. power D. work
12. A bar of initial length l_0 is heated through a temperature range $\Delta\theta$ to a new length l . The linear expansivity of the bar is
A. $\frac{l - l_0}{l\Delta\theta}$ B. $\frac{l - l_0}{l\Delta\theta}$
C. $l_0(l + \Delta\theta)$ D. $\frac{l - l_0}{l(l + \Delta\theta)}$
13. The real depth of a pond is 6.0 m. A boy observes a fish at the bottom of the pond. What is the apparent depth if the refractive index is $\frac{4}{3}$?
A. 8.0m B. 5.5m C. 5.0m D. 4.5m
14. If U is the object distance and V the image distance, which of the following expressions gives the linear magnification produced by a convex lens of focal length f ?
A. $\frac{U}{f}$ B. $\frac{U}{V} + f$
C. $\frac{V}{f} + 1$ D. $\frac{V}{f} - 1$
15. A light wave has a wavelength of 500 nm in air. The frequency of the wave is
A. 3.0×10^{14} Hz B. 6.0×10^{14} Hz
C. 6.0×10^{12} Hz D. 2.5×10^{14} Hz

PHYSICS 2012/2013 ANSWERS

1. The force on a current carrying conductor in a magnetic field is greatest when the conductor is at right angles with the field. **Ans. D**
Read No 2 below for more details.
2. A charged particle moving in a **B**-field experiences a *sideways* force that is proportional to the strength of the magnetic field, the component of the velocity that is perpendicular to the magnetic field and the charge of the particle. This force is known as the **Lorentz force**, and is given by
$$\mathbf{F} = q\mathbf{v} \times \mathbf{B}$$
where **F** is the force, q is the electric charge of the particle, v is the instantaneous velocity of the particle, and **B** is the magnetic field (in teslas). The Lorentz force is always perpendicular to both the velocity of the particle and the magnetic field that created it. **Ans. B**
3. In an a.c circuit that contains only a capacitor, the voltage lags behind the current by 90° . **Ans. A**
For more details, go to Question No 11 of 2006/07.
4. Note the following carefully:
• **Alpha particles** are doubly charged ($+2e$) particles containing two protons and neutrons. They are identical to the nucleus of helium atom (${}^4\text{He}$).
• **Beta particles** are electrons.
• **Gamma rays** are particles or quanta, or photons, of electromagnetic energy.
In gamma decay, the mass and proton numbers do not change. The daughter nucleus is simply the parent nucleus with less energy. **Ans. A**
5. Louis de Broglie proposed that a particle of mass m traveling with a velocity v would have a wavelength λ given by the equation: $\lambda = \frac{h}{mv}$ where h is the Planck constant. **Ans. B**
6. Cathode ray causes gas molecules and fluorescent materials to glow. **Ans. A**
7. The relationship between the gravitational force of attraction of two masses and the distance between them is an inverse relationship. It is otherwise referred to as the inverse square law and is given thus: $F \propto \frac{1}{r^2}$

where F is the gravitational force of attraction and r is the distance between the masses.

Considering the relation, if r is tripled, F would decrease by one-ninth. **Ans. D**

8. $R = 6.4 \times 10^6 \text{ m}$, $g = 10 \text{ ms}^{-2}$

$$\begin{aligned}\text{escape velocity, } v_e &= \sqrt{2Rg} \\ &= \sqrt{2 \times 6.4 \times 10^6 \times 10} \\ &= 1.13 \times 10^4 \text{ ms}^{-1}\end{aligned}$$

Ans. A

9. To obtain the height, we equate potential energy to kinetic energy.

Potential energy, PE = Kinetic energy, KE

$$mgh = \frac{1}{2}mu^2$$

$$gh = \frac{u^2}{2}$$

$$h = \frac{u^2}{2g}$$

Ans. D

10. The rate of heat loss of a body is proportional to the difference in temperature between the body and its surrounding. This is Newton's law of cooling. **Ans. A**

11. Pressure = Nm^{-2} , Volume = m^3

$$\frac{\text{Pressure}}{\text{Volume}} = \text{pressure} \times \text{volume}$$

$$= \text{Nm}^{-2} \times \text{m}^3 = \text{Nm}$$

$$= \text{force} \times \text{distance} = \text{work}$$

The unit is that of work. **Ans. D**

12. The linear expansivity of a metal is defined as the increase in length per unit length per degree Celsius rise in temperature. **Ans. B**

13. real depth = 6.0m, apparent depth = ?, refractive index = 4/3.

$$\text{But refractive index} = \frac{\text{real depth}}{\text{apparent depth}}$$

$$\rightarrow \text{apparent depth} = \frac{\text{real depth}}{\text{refractive index}} = \frac{6}{4/3} = 4.5\text{m}$$

Ans. D

14. Object distance = U , Image distance = V

$$\text{Magnification, } M = \frac{V}{U} = V\left(\frac{1}{U}\right)$$

$$\text{From lens formula, } \frac{1}{f} = \frac{1}{U} + \frac{1}{V}; \text{ we have}$$

$$\frac{1}{U} = \frac{1}{f} - \frac{1}{V}$$

$$\Rightarrow M = V\left(\frac{1}{U}\right) = \frac{V}{f} \cdot \frac{1}{V} = \frac{V}{f} \cdot 1$$

Ans. D

15. wavelength, $\lambda = 500\text{nm} = 500 \times 10^{-9}\text{m}$,

vel. of light, $c = 3 \times 10^8 \text{ ms}^{-1}$

frequency, $f = ?$

but $c = f\lambda \Rightarrow f = \frac{c}{\lambda}$

$$f = \frac{3 \times 10^8}{500 \times 10^{-9}} = 6 \times 10^{14} \text{ Hz}$$

Ans. B

SUMMARY OF ANSWERS

[PHYSICS 2012/2013]

1.D	2.B	3.A	4.A	5.B
6.A	7.D	8.A	9.D	10.A
11.D	12.B	13.D	14.D	15.B

BONUS TIP

MY UNN DREAMS Students' Forum is a Facebook group specially created for admission seekers especially UNN aspirants. Do you desire to be guided and nurtured to avoid certain admission pitfalls and reposition yourself for a successful admission search? Do you want to be receiving prompt information about JAMB UTME, POST UTME and Admissions, then request to join the group. Just log on to: www.facebook.com/groups/myunndreams

PHYSICS 2012/13 QUESTIONS [2]

1. The ratio of electrostatic force F_e to gravitational force F_g between two protons each of charge e and mass m , at a distance d is
- A. $\frac{e}{4\pi\epsilon_0 Gm}$ B. $\frac{e^2}{Gm^2}$
C. $\frac{Gm^2}{4\pi\epsilon_0 e^2}$ D. $\frac{e^2}{4\pi\epsilon_0 Gm^2}$
2. The energy stored in an inductor of inductance 5mH when a current of 6A flows through it is
- A. $9.0 \times 10^{-3}\text{J}$ B. $9.0 \times 10^2\text{J}$
C. $1.4 \times 10^{-2}\text{ J}$ D. $1.8 \times 10^2\text{ J}$
3. An electric heater with a pd of 240V connected across its terminals has a total resistance of 960Ω . Calculate power range of the heater
- A. 0.25 W B. 4.00 W
C. 38.40 W D. 60.00 W
4. The time it will take a certain radioactive material with a half-life of 50 to reduce to $\frac{1}{2}$ of its original number is
- A. 250 days B. 150 days
C. 300 days D. 200 days
5. The unit of moment of a couple can be expressed in
- A. Nm^{-1} B. Nm^{-2} C. Nm D. Nm^2
6. The resultant of two forces 12N and 5N is 13N . What is the angle between the two forces?
- A. 0° B. 45° C. 90° D. 180°
7. A body of mass 12Kg traveling at 4.2ms^{-1} collides with another body of mass 18Kg at rest. Calculate their common velocity if the two bodies coalesce after collision.
- A. 1.5ms^{-1} B. 1.4ms^{-1}
C. 2.1ms^{-1} D. 1.7ms^{-1}
8. When left in a freezer, a bottle full of water cracks on freezing into ice because of the
- A. increase in the volume of water
B. contraction of the bottle
C. expansion of the bottle
D. decrease in the volume of water

9. At constant pressure, the density of a given gas is
- A. constant with temperature
B. proportional to its volume
C. inversely proportional to its temperature
D. independent on its volume
10. When the vapour of a substance is in equilibrium with its own liquid, it is said to be
- A. gaseous B. liquified
C. diffused D. saturated
11. If the pressure of 100cm^3 of an ideal gas is doubled while its Kelvin temperature is halved, then the new volume of the gas is
- A. 25cm^3 B. 50cm^3
C. 100cm^3 D. 200cm^3
12. The eye controls the amount of light reaching the retina by adjusting the
- A. cornea B. iris
C. retina D. optic nerve
13. Transverse waves can be distinguished from longitudinal waves using the characteristics of
- A. diffraction B. refraction
C. polarization D. reflection
14. The production of pure spectrum could easily be achieved using
- A. a glass prism with a pin
B. triangular prism with two convex
C. triangular prism only
D. triangular prism with two concave lenses
15. When the length of a vibrating string is reduced by one-third, its frequency becomes
- A. three times its former value
B. twice its former value
C. one-third its former value
D. one-sixth its former value

SUCCESS QUOTE

"Hard work is the key to success. So work diligently on any project you undertake. If you truly want to be successful, be prepared to give up your leisure time..."
— Charles Lazarus

PHYSICS 2012/2013 ANSWERS [2]

1. Electrostatic force = $F_e = \frac{e^2}{4\pi\epsilon_0 d^2}$

Gravitational force = $F_g = \frac{Gm^2}{d^2}$

$$\frac{F_e}{F_g} = \frac{\frac{e^2}{4\pi\epsilon_0 d^2}}{\frac{Gm^2}{d^2}} = \frac{e^2}{4\pi\epsilon_0 d^2} \times \frac{d^2}{Gm^2}$$

$$= \frac{e^2}{4\pi\epsilon_0 Gm^2} \quad \text{Ans. D}$$

2. $L = 5\text{mH} = 5 \times 10^{-3}$, $I = 6\text{A}$,
Energy, $W = \frac{1}{2}LI^2 = \frac{1}{2} \times 5 \times 10^{-3} \times 6^2$
 $= 9.0 \times 10^{-2} \text{ J}$

Ans. B

3. pd , $V = 240\text{V}$, Resistance, $R = 960\Omega$
Electric power = $\frac{V^2}{R} = \frac{240^2}{960} = 60\text{W}$

Ans. D

4. The fraction of a radioactive material with n half-lives is given by $(\frac{1}{2})^n$. But from the question, the fraction is $\frac{1}{32}$.

This implies that $(\frac{1}{2})^n = \frac{1}{32}$
 $2^n = 32^1$
 $2^n = 2^5$

Equating the powers, we have $n = 5$ i.e. Number of half-life = 5

Total time taken = No of half-life x half-life
 $= 5 \times 50 = 250\text{days}$

Ans. A

5. The moment of couple is obtained as the product of force and distance. The unit is Newton-meter (Nm).

Ans. C

6.

Using cosine rule,

$$\cos\theta = \frac{a^2 + b^2 - c^2}{2ab}$$

$$\cos\theta = \frac{12^2 + 5^2 - 13^2}{2 \times 12 \times 5}$$

$$\cos\theta = 0$$

$$\theta = \cos^{-1}(0) = 90^\circ$$

Ans. C

7. mass of first body (m_1) = 12kg
velocity of first body (v_1) = 4.2m/s
mass of the second body (m_2) = 18kg
velocity of the second body (v_2) = 0m/s

$m_1v_1 + m_2v_2 = (m_1 + m_2)v$

$(12 \times 4.2) + 18 \times 0 = (12 + 18)v$

$50.4 = 30v, v = 1.7\text{m/s}$

Ans. D

8. One of water's most remarkable properties is that it expands when it freezes to a volume that is always 10% greater than in the liquid state. In other words, 10 cups of water put into the freezer is going to turn into 11 cups of ice when it freezes. This expansion takes place with tremendous force, enough to burst the strongest water bottles if the water in them freezes. Ans. A

9. The density of gases depends upon the temperature. The higher the temperature, the more the molecules are spread out and the lower the density, provided that pressure is kept constant. In other words, there is an inverse relationship between the temperature of a given mass of gas and its density at constant pressure.

Ans. C

10. When the vapour of a substance is in equilibrium with its own liquid, it is said to be saturated. Any addition of thermal energy to a saturated liquid will cause it to vaporize. Any subtraction of thermal energy from a saturated vapour will cause it to condense.

Ans. D

11. $P_1 = P, V_1 = 100\text{cm}^3, T_1 = T, P_2 = 2P, T_2 = \frac{1}{2}T, V_2 = ?$

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

$$\frac{P \times 100}{T} = \frac{2P \times V_2}{\frac{1}{2}T}$$

$$V_2 = \frac{P \times 100 \times \frac{1}{2}T}{T \times 2P} = 25\text{ cm}^3$$

Ans. A

12. The iris is a thin, circular structure in the eye, responsible for controlling the diameter and size of the pupils and thus the amount of light reaching the retina.

Ans. B

13. Note the following:

(i) In a longitudinal wave, the motion of the medium is parallel to the direction of the wave. This means that the particles move left and right which in turn makes the other particles start to oscillate. Sound waves are longitudinal waves.

(ii) A transverse wave is a wave in which the motion of the medium is at right angles to the direction of the wave. A wave on a rope is a transverse wave. Light and other electromagnetic waves are also transverse waves.

If the vibrations of a transverse wave are in one plane only, then that wave is said to be plane-polarized. Longitudinal waves cannot be plane-polarized.

Ans. C

14. A spectrum can be pure or impure. The latter is one in which light of one wavelength overlaps the adjacent wavelength. The former is the one in which each color gives a sharp impression, as the wavelengths do not overlap. An instrument used for producing a pure spectrum is a spectrometer though production of pure spectrum could also be achieved using a triangular prism and two convex lenses.

Ans. B

15. There is an inverse relationship between the length of a vibrating string and the frequency of the note emitted (as long as the tension and the mass per unit length are kept constant). This implies that if the length is reduced by one-third, the frequency becomes three times its former value.

Ans. A

SUMMARY OF ANSWERS [PHYSICS 2012/2013 (2)]

1.D	2.B	3.D	4.A	5.C
6.C	7.D	8.A	9.C	10.D
11.A	12.B	13.C	14.B	15.A

SUCCESS QUOTE

"If you want to succeed in your life,
always remember this phrase:
'The past does not equal the future.'
That you have sought admission for
many years without success doesn't
mean anything...All that matters is:
What are you going to do, right now?"

- Henry Divine

PHYSICS 2013/2014 QUESTIONS

1. The function of the manganese (IV) oxide in a leclanché cell is to
 - A. decrease the emf of the cell
 - B. prevent local action in the cell
 - C. prevent polarization of the cell
 - D. increase the density of the electrolyte
2. How long does it take a 750 W heater operating at full rating to raise the temperature of 1 kg of water from 40°C to 70°C? (Take the specific heat capacity of water as 4200 Jkg⁻¹K⁻¹ and neglect heat losses.)
 - A. 84 s
 - B. 168 s
 - C. 112 s
 - D. 280 s
3. The main reason why rice cooks faster in a pressure cooker than in cooking pot is that
 - A. less heat escapes from the cooker
 - B. the vapour pressure in the cooker is constant
 - C. the vapour pressure of the cooker decreases
 - D. the boiling point of water in the cooker is raised
4. The fundamental frequency of vibration of a sonometer wire may be halved by
 - A. doubling the length of the wire
 - B. doubling the mass of the wire
 - C. reducing the tension by half
 - D. reducing the absolute temperature by half
5. A column of air 10.0 cm long is trapped in a tube at 27°C. What is the length of the column at 100°C?
 - A. 12.4 cm
 - B. 13.7 cm
 - C. 18.5 cm
 - D. 37.0 cm
6. Which of the following electromagnetic waves has the shortest wavelength?
 - A. radio waves
 - B. X-rays
 - C. infrared
 - D. ultraviolet
7. Which of the following is NOT conserved in an inelastic collision?
 - A. momentum
 - B. mass
 - C. kinetic energy
 - D. total energy
8. A series RLC circuit has a resistance of 50.0Ω, a capacitance of 6.00 nF, and an inductance of 28.0

mH. The circuit is connected to a wide-range, adjustable frequency voltage source with an output of 25.0 V. What is the resonance frequency of the circuit?

- A. 12.3 KHz B. 12.3 Hz
C. 12.3 mHz D. 12.3 μ Hz

9. The area under a force-distance graph represents

- A. acceleration B. velocity
C. work D. momentum

10. Determine the inductive reactance when a 30.0mH inductor with negligible resistance is connected to a 1.3KHz oscillator

- A. 39.0Ω B. 122.5Ω
C. 245.0Ω D. $39K\Omega$

SUCCESS QUOTE

"Some candidates' names will appear on the merit admission list in the next few months. Do you desire that your name be there? Do you know that self discipline, sacrifice of immediate and unprofitable pleasures, hard work and prayers are the necessary tools you need to back up your desire if it must come to reality?"

~ Henry Divine

PHYSICS 2013/2014 ANSWERS

1. A Leclanche cell is a dry cell battery that uses a moist paste as the electrolyte solution. The moist paste electrolyte is generally a combination of powdered carbon, NH_4Cl , MnO_2 , and ZnCl_2 .

The chemical action that occurs in the cell while the current is flowing causes hydrogen bubbles to form on the surface of the anode. This action is called *polarization*. A cell that is heavily polarized has no useful output. There are several methods to prevent polarization or to depolarize the cell. One of them is to use material that is rich in oxygen, such as manganese dioxide, which supplies free oxygen to combine with the hydrogen and form water.

Ans. C

2. $t = ?$, $P = 750\text{W}$, $m = 1\text{kg}$, $0_i = 40^\circ\text{C}$, $0_f = 70^\circ\text{C}$,

$\Delta\theta = 30^\circ\text{C}$, $c = 4200 \text{ J kg}^{-1}\text{K}^{-1}$

Recall that:

$$\text{Power} = \text{Energy} \div \text{Time}$$

This implies that:

$$\text{Energy} = \text{Power} \times \text{Time}.$$

heat lost by heater = heat gained by water

$$P \times t = mc\Delta\theta$$

$$750 \times t = 1 \times 4200 \times 30$$

$$t = \frac{1 \times 4200 \times 30}{750} = 168 \text{ s}$$

Ans. B

3. The main reason why rice cooks faster in a pressure cooker than in cooking pot is that the boiling point of water in the pressure cooker is raised. This makes the temperature of water in the pressure cooker to be higher than in a cooking pot.

Ans. D

4. Ans. A

For more details, go to the Answer to Question No 10 of 2005/2006

5. From the question, $P_1 = 10.0\text{cm}$;

$$T_1 = 27 + 273 = 300\text{K}; P_2 = ?;$$

$$T_2 = 100 + 273 = 373\text{K}$$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$P_2 = \frac{P_1 T_2}{T_1} = \frac{10 \times 373}{300} = 12.4 \text{ cm}$$

Ans. A

6. Below are some electromagnetic waves written in order of descending wavelengths: radio wave, microwave, infrared, visible, ultraviolet, X-rays, gamma rays.
Ans. B

7. In an inelastic collision, momentum is conserved but kinetic energy is not. This means that some kinetic energy is lost but the amount of kinetic energy lost must be consistent with momentum conservation.
Ans. C

8. $R = 50.0\Omega$; $V = 25.0V$

$$C = 6.00nF = 6.00 \times 10^{-9}F$$

$$L = 28.0 \text{ mH} = 28.0 \times 10^{-3} \text{ H}$$

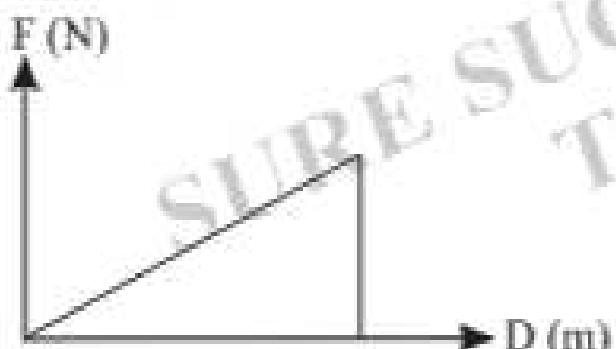
$$\text{Resonance frequency, } f_r = \frac{1}{2\pi\sqrt{LC}}$$

$$= \frac{1}{2\pi\sqrt{(28.0 \times 10^{-3})(6.00 \times 10^{-9})}}$$

$$= 12.3 \times 10^3 \text{ Hz} = 12.3 \text{ KHz}$$

Ans. A

9. Consider the force-distance graph below [where F = Force (N) and D = Distance (m)].



The area under the graph is a triangle.

$$\text{Area} = \frac{1}{2} \text{ base} \times \text{height} = \frac{1}{2} D \text{ (m)} \times F(\text{N}) \\ = \frac{1}{2} FD \text{ (Nm)}$$

Nm is the unit of work.

Ans. C

10. **Ans. C**

For more details, go to the Answer to Question No 13 of 2009/2010.

SUMMARY OF ANSWERS

[PHYSICS 2013/2014]

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

**SUCCESS
QUOTE**

"Your past cannot be changed,
but you can change your
tomorrow by your actions today."
~David McNally

PHYSICS 2014/2015 QUESTIONS

[Morning]

- Which of the following is most strongly deflected by a magnetic field?
A. gamma rays B. alpha particles
C. beta particles D. X-ray
- The principle of operation of an induction coil is based on
A. Ohm's law B. Ampere's law
C. Faraday's law D. Coulomb's law
- A ray of light is incident on a plane surface at an angle of 40°. What is the angle of reflection?
A. 40° B. 80°
C. 20° D. 50°
- The particle and wave nature of matter are demonstrated in the equation
A. $\lambda = \frac{hc}{E}$ B. $\lambda = \frac{c}{f}$
C. $\lambda = \frac{h}{p}$ D. $\lambda = 2d \sin\theta$
- A 12-V battery has an internal resistance of 0.5 ohms. If a cable of 1.0 ohms resistance is connected across the two terminals of the battery, the power dissipated is
A. 64W B. 96W
C. 9.6W D. 192W
- The force on a current carrying conductor in a magnetic field is greatest when the
A. conductor makes an angle of 60° with the field
B. force is independent of the angle between the field and the conductor
C. conductor is parallel with the field
D. conductor is at right angles with the field
- The kind of nuclear reaction initiated by

bombardment of neutron is

- A. nuclear infusion B. nuclear fission
C. nuclear fusion D. radioactivity

8. Two balls of masses 40 g and 60 g respectively, are attached firmly to the ends of a light metre rule. The centre of gravity of the system is
A. at the mid-point of the metre rule
B. 40 cm from the lighter mass
C. 40 cm from the heavier mass
D. 60 cm from the heavier mass

9. Hydrogen molecules escape from the topmost layer of the earth's atmosphere because
A. hydrogen has negligible mass and has speed above escape velocity
B. the gravitational pull of the earth is negligible in the atmosphere
C. the intermolecular forces in the atmosphere is negligible
D. escape velocity is negligible compared to the speed of hydrogen molecules

10. If the refractive index of a medium is $\frac{2}{3}$, what is the critical angle?
A. 90° B. 45°
C. 60° D. 30°

BONUS TIP

Endeavor to read through the *Admission Success Tips* in this book. Read from the first one through to the last one. You may find out that you need to make one or two adjustments in certain areas to reposition yourself for a successful admission search.

PHYSICS 2014/2015 ANSWERS

(MORNING)

1. Beta-particles are most strongly deflected by a magnetic field. Ans. C

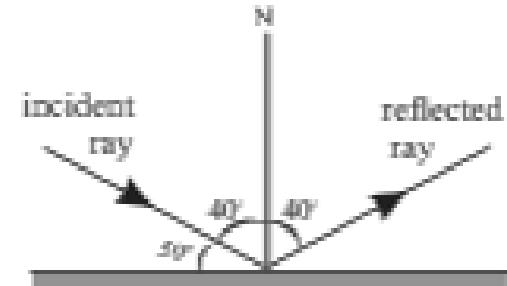
For detailed explanation of this, go to Physics 109 (Quick Revision Aids). Read nos 102, 103, 104 and 105.

2. Ans. C

Get more details on this at Question No 12 of Year 2005/2006.

3. The law of reflection

states that *angle of incidence equals angle of reflection.*



Angle of incidence = angle of reflection = 40° .

Ans. A

4. It was De Broglie who suggested that particles have wave properties. He stated that the wavelength λ of the waves carried with the particles is given by $\lambda = \frac{h}{mv} = \frac{h}{p}$

where mv or p is the momentum of the particles of mass m and velocity v , and h is the Planck constant. Ans. C

Compare with Question No 5 of year 2012/2013.

5. $E = 12V$; $r = 0.5\Omega$; $R = 1.0\Omega$; $I = ?$

$$E = I(R + r)$$

$$I = \frac{E}{(R + r)} = \frac{12}{1 + 0.5} = 8A$$

But the power in a resistance R carrying a current I is given by $P = IR$.

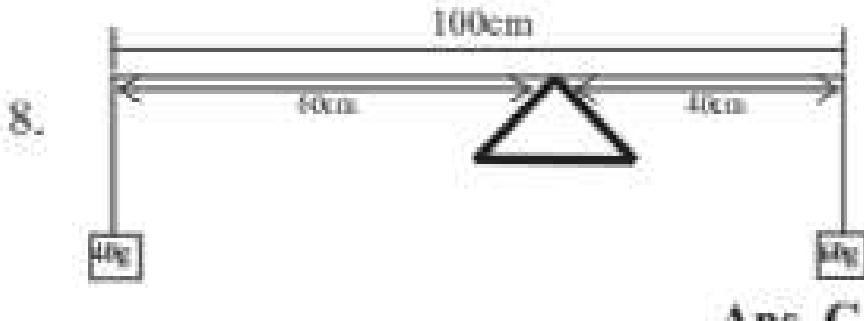
Therefore, $P = 8^2 \times 1.0 = 64W$. Ans. A

6. Ans. D

For detailed explanation, go to the Answers to Questions 1 and 2 of year 2012/2013.

7. Ans. B

For detailed explanation, go to the Answer to Question No 14 of year 2010/2011 (Day 1).



Ans. C

9. The topmost layer of the earth's atmosphere is called the exosphere. This layer is mainly composed of extremely low densities of hydrogen, helium and several heavier molecules including nitrogen, oxygen and carbon dioxide. The molecules of the exosphere absorb radiation from the Sun, which heats them to temperatures over $2,000^{\circ}\text{C}$ and gives them high kinetic energy but the velocity of individual molecules is determined by their masses according to $E_{\text{kin}} = \frac{1}{2}mv^2$. This implies that the less massive the molecule of a gas is, the higher the average velocity of the molecules of that gas at a given temperature and the more likely it is that any of them would reach escape velocity. This is why hydrogen molecules (the lightest molecule) escape the earth's atmosphere into outer space. Ans. A

10. refractive index, $n = \frac{2}{\sqrt{3}}$
critical angle, $C = ?$

$$\sin C = \frac{1}{n}$$

$$\sin C = \frac{1}{\frac{2}{\sqrt{3}}} = \frac{\sqrt{3}}{2}$$

$$C = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = 60^{\circ}$$

Ans. C

SUMMARY OF ANSWERS [PHYSICS 2014/2015 (MORNING)]

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

SUCCESS QUOTE

"It's never too late to start,
but it's always too early to quit."

- Nelson DeMille

PHYSICS 2014/2015 QUESTIONS

[AFTERNOON]

1. The half-life of a radioactive element is 9days. Calculate the fraction that remains after 36days.
A. 1/16 B. 1/32
C. 1/8 D. 1/64
2. The purpose of a dielectric material in a parallel plate capacitor is to
A. increase its capacitance
B. decrease its capacitance
C. insulate the plates from each other
D. increase the magnetic field between them
3. A 12-V battery has an internal resistance of 0.5 ohms. If a cable of 1.0 ohms resistance is connected across the two terminals of the battery, the power dissipated is
A. 64W B. 96W
C. 9.6W D. 192W
4. The force constant of the load-extension graph of a spring is given by the
A. slope of the linear portion of the graph
B. length of the linear portion of the graph
C. area under the linear portion of the graph
D. area under the entire graph
5. Which of the following properties is exclusive to electromagnetic waves?
A. reflection B. refraction
C. polarization D. diffraction
6. Which of the following is FALSE about gases in kinetic theory of gases?
A. gases have large molecules
B. the molecules of a gas are all identical
C. the molecules of a gas collide with one another and with the walls of the container
D. as temperature increases, the number of collisions made by the gas molecules increase
7. For a long-sighted person, light rays from a point

on a very distant object is focused

- A. in front of the retina
- B. behind the retina
- C. on the retina
- D. behind the retina by a diverging lens

8. A copper wire has a resistance of $25 \text{ m}\Omega$ at 20°C .

When the wire is carrying current, heat produced by the current causes its temperature to increase by 27°C . What is the change in the wire's resistance? [take temperature coefficient of resistivity of copper, $\alpha = 6.8 \times 10^{-3}$]

- A. $1.2 \text{ m}\Omega$
- B. $11.8 \text{ m}\Omega$
- C. $2.3 \text{ m}\Omega$
- D. $4.6 \text{ m}\Omega$

9. Which of the following expressions give the relationship between the acceleration due to gravity at the earth's surface g and the universal constant of gravitation G ?

- A. $g = \frac{GM}{2R}$
- B. $g = \frac{GMm}{R}$
- C. $g = \frac{GMm}{R^2}$
- D. $g = \frac{GM}{R^2}$

10. The number of protons in an element increased by one after a radioactive decay. The element must have decayed by emitting

- A. a gamma ray
- B. a beta particle
- C. an alpha particle
- D. a neutron

SUCCESS QUOTE

"Don't say you don't have enough time. You have exactly the same number of hours per day that were given to Helen Keller, Pasteur, Michelangelo, Mother Teresa, Leonardo Da Vinci, Thomas Jefferson, and Albert Einstein."

~ H Jackson Brown

PHYSICS 2014/2015 ANSWERS

[AFTERNOON]

1. Ans. A

For detailed explanation, go to the Answer to Question No 14 of Year 2010/2011 [Day 2].

2. Ans. A

For detailed explanation, go to the Answer to Question No 12 of Years 2010/2011 [Day 1] and 2006/2007.

3. $E = 12\text{V}$; $r = 0.5\Omega$; $R = 1.0\Omega$; $I = ?$

$$E = I(R + r)$$

$$I = \frac{E}{(R + r)} = \frac{12}{1 + 0.5} = 8 \text{ A}$$

But the power in a resistance R carrying a current I is given by $P = IR$.

Therefore, $P = 8^2 \times 1.0 = 64\text{W}$.

Ans. A

4. The force constant of the load-extension graph of a spring is given by the slope of the linear portion of the graph.

Ans. A

5. Ans. C

For detailed explanation, go to the Answer to Question No 13 of year 2012/2013 (2).

6. The kinetic theory of gases describes a gas as a large number of small, identical particles (atoms or molecules), all of which are in constant, random motion. The rapidly moving particles constantly collide with each other and with the walls of the container.

Ans. A

7. Long-sightedness (or hypermetropia or hyperopia) is an eye defect which manifests in the ability to see distant objects clearly but not nearby objects arising either because the eyeball is too short or the lens is too weak. In this condition, the *near point* of the eye is not at the normal position but at some point farther from the eye. Image from an object that is closer to the eye than the near point is formed behind the retina and cannot be seen clearly. Images from far objects are focused on the retina properly and can be seen clearly. This defect is corrected by using a concave lens.

Ans. C

8. Initial resistance, $R_0 = 25\text{m}\Omega$

Initial temperature, $T_0 = 20^\circ\text{C}$

Change in temperature, $\Delta T = 27^\circ\text{C}$

Change in resistance, $\Delta R = ?$

Temperature coefficient of resistivity $\alpha = 6.8 \times 10^{-3}$

$$\Delta R = R_0 \alpha \Delta T$$

$$= 25 \times 6.8 \times 10^{-3} \times 27 = 4.6\text{m}\Omega$$

Ans. D

9. Consider a mass m on the surface of the earth. It will experience a gravitational force:

$$F = \frac{GmM}{R^2}$$

but this force is also its weight (mg). Therefore:

$$mg = \frac{GmM}{R^2}$$

dividing both sides by m , we have $g = \frac{GM}{R^2}$.

Ans. D

10. Beta particles are subatomic particles ejected from the nucleus of some radioactive atoms.

They are equivalent to electrons. The difference is that beta particles originate in the nucleus and electrons originate outside the nucleus.

Beta particle emission occurs when the ratio of neutrons to protons in the nucleus is too high. In this case, an excess neutron transforms into a proton and an electron. The proton stays in the nucleus and the electron is ejected energetically.

This process decreases the number of neutrons by one and increases the number of protons by one.

Ans. B

PHYSICS 2015/2016 QUESTIONS

Computer Based Test (CBT)

1. From the kinetic theory of gases, temperature is a

A. form of energy and is proportional to the total kinetic energy of the molecules.

B. form of energy and is proportional to the average kinetic energy of the molecules.

C. physical property and is proportional to the total kinetic energy of the molecules.

D. physical property and is proportional to the average kinetic energy of the molecules.

2. A 20-toothed gear wheel drives a 60-toothed one.

If the angular speed of the smaller wheel is 120 rev s⁻¹ the angular speed of the larger wheel is

A. 3 rev s⁻¹ B. 40 rev s⁻¹

C. 360 rev s⁻¹ D. 2400 rev s⁻¹

3. The speed of sound in air at sea-level is 340 ms⁻¹

while that of light is 300000 km s⁻¹. How far (to the nearest meter) from the centre of a thunderstorm is an observer who hears a thunder 2s after a lightening flash?

A. 170 m B. 340 m

C. 600 m D. 680 m

4. A cell of internal resistance 2 ohms supplies current to a 6-ohm resistor. The efficiency of the cell is

A. 12.0% B. 25.0%

C. 33.3% D. 75.0%

5. The length of a side of metallic cube at 20°C is 5.0 cm. Given that the linear expansivity of the metal is $4.0 \times 10^{-5} \text{K}^{-1}$. Find the volume of the cube at 120°C.

A. 126.50 cm³ B. 126.25 cm³

C. 126.00 cm³ D. 125.00 cm³

6. As a result of air at the top of a barometer, the height of the mercury column is 73.5 cm when it should be 75.0 cm; the volume of the space above the mercury is 8.0 cm³. Calculate the correct

SUMMARY OF ANSWERS

[PHYSICS 2014/2015 (AFTERNOON)]

1.A

2.A

3.A

4.A

5.C

6.A

7.C

8.A

9.D

10.B

SUCCESS QUOTE

"To be successful, you must decide exactly what you want to accomplish, then resolve to pay the price to get it."

~ Bunker Hunt

barometric height when the barometer reads 74.0 cm and the volume of the space above the mercury is 6.0cm^3 .

- A. 72.0 cm B. 74.5 cm
C. 75.1 cm D. 76.0 cm

7. A wave has a frequency of 2 Hz and a wavelength of 30 cm. The velocity of the wave is

- A. 60.0 ms^{-1} B. 6.0 ms^{-1}
C. 1.5 ms^{-1} D. 0.6 ms^{-1}

8. If the distance between two stationary charged particles is doubled, the magnitude of the electrostatic force between them will be

- A. Doubled B. Halved
C. A quarter of its former value
D. Unchanged
E. Four times the original value

9. Which of the following methods CANNOT be used to produce a steel magnet? The

- A. passing of an electric current through a solenoid
B. repeated stroking of the specimen with a magnet
C. repeated stroking of the specimen in opposite directions with two magnets
D. heating of the specimen
E. hammering of the specimen in the earth's magnetic fields

10. Of the following derived units, the one that is not a unit of power is

- A. joule/second B. ampere volt
C. ampere² ohm D. ohm²/volt
E. volts²/ohm

11. Which of the following may be used to determine the relative humidity in a physics laboratory?

- I. Manometer
II. Wet and dry bulb hygrometer
III. Hair Hygrometer

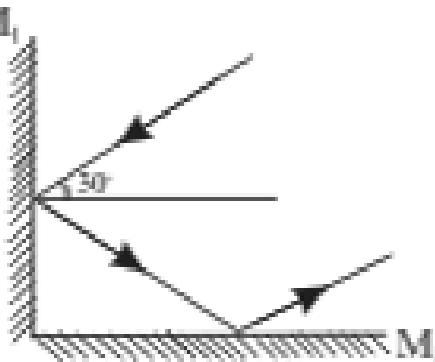
IV. Hydrometer

- A. I only B. II and III only
C. II only D. III only
E. II, III and IV only

12. A machine has a velocity ratio of 5. It requires a 50kg weight to overcome a 200kg weight. The efficiency is

- A. 4% B. 5%
C. 40% D. 50%
E. 80%

13.



Two mirror M₁ and M₂ are inclined at right angles as shown above. Calculate the angle of reflection of the ray of light at mirror M₂.

- A. 30° B. 45°
C. 60° D. 90°

14. When an atom loses or gains a charge, it becomes

- A. an electron B. an ion
C. a neutron D. a proton

15. A tap supplies water at 25°C while another

supplies water at 75°C. If a man wishes to bathe with water at 40°C, the ratio of the mass of cold water to the mass of hot water required is

- A. 1:3 B. 15:8
C. 7:3 D. 3:1

SUCCESS QUOTE

"The best friend of a lazy man is 'Mr. Excuse' who lives at 'Talk Avenue' and is married to 'Lady Sleep'."

~ Yomi Kasali

PHYSICS 2015/2016 ANSWERS

1. According to the kinetic theory of gases, the temperature of a gas is a physical property and is directly proportional to the average kinetic energy of the molecules. **Ans. D**

2. Note that gears are toothed wheels used to move loads. For two gears in mesh, the large gear normally has a greater number of teeth than the small gear and the velocity ratio is obtained as the ratio of the angular speed of one to that of the other.

$$\text{Velocity ratio} = \frac{\omega_s}{\omega_l} = \frac{n_s}{n_l}$$

where

ω_s = angular speed of small gear

ω_l = angular speed of large gear

n_s = number of teeth on small gear

n_l = number of teeth on large gear

Note that the small gear always rotates faster.

$$\text{For the question, } \frac{120}{\omega_s} = \frac{60}{20}$$

$$\omega_s = \frac{20 \times 120}{60}$$

$$= 40 \text{ rev s}^{-1} \quad \text{Ans. B}$$

3. From the question, the sound of the thunder moved at a speed of 340 m/s for 2 secs before getting to the observer. Therefore, distance of the observer from the centre of the thunderstorm is obtained as: distance = speed x time.

$$\text{Distance} = 340 \times 2 = 680 \text{ m} \quad \text{Ans. D}$$

$$\begin{aligned} 4. \text{Efficiency} &= \frac{R}{R+r} \times 100\% = \frac{6}{6+2} \times 100\% \\ &= \frac{6}{8} \times 100\% = 75\% \end{aligned} \quad \text{Ans. D}$$

5. From the question, $l_1 = 5.0 \text{ cm}$, $\theta_1 = 20^\circ\text{C}$, $\theta_2 = 120^\circ\text{C}$. Linear expansivity, $\alpha = 4.0 \times 10^{-5} \text{ K}^{-1}$, $l_2 = ?$,
 But $\alpha = \frac{l_2 - l_1}{l_1(\theta_2 - \theta_1)}$

This implies that $l_2 = [a \times l_1(\theta_2 - \theta_1)] + l_1$

$$\therefore l_2 = [4.0 \times 10^{-5} \times 5(120 - 20)] + 5$$

$$= [4.0 \times 10^{-5} \times 5(100)] + 5$$

$$= [2000 \times 10^{-5}] + 5$$

$$= [2 \times 10^3 \times 10^{-5}] + 5$$

$$= [2 \times 10^{-2}] + 5 = [2 \times 0.01] + 5$$

$$= 0.02 + 5 = 5.02 \text{ cm}$$

$$\text{New volume} = l_2 \times l_2 \times l_2$$

$$= 5.02 \times 5.02 \times 5.02 = 126.50 \text{ cm}^3$$

Ans. A

6. We use the law $P_1 V_1 = P_2 V_2$, putting into consideration the slight difference in pressure as a result of the air at the top of the barometer.

$$(75 - 73.5) \times 8 = (x - 74) \times 6$$

$$1.5 \times 8 \div 6 = (x - 74)$$

$$2 = x - 74, x = 76 \text{ cm}$$

Ans. D

7. From the question: frequency, $f = 2 \text{ Hz}$,

wavelength, $\lambda = 30 \text{ cm} = 0.3 \text{ m}$

$$\text{Velocity of wave, } v = f\lambda = 2 \times 0.3 = 0.6 \text{ ms}^{-1}$$

Ans. D

8. The force between two stationary charges is inversely proportional to the square of the distance between them, i.e.

$$F \propto \frac{1}{d^2} \rightarrow F = \frac{k}{d^2}$$

where F = force, d = dist. and k = const.

This implies that $Fd^2 = k$ and $F_1(d_1)^2 = F_2(d_2)^2$.

If distance is doubled, then $d_2 = 2d_1$. This gives

$$F_1(d_1)^2 = F_2(2d_1)^2 = 4F_1(d_1)^2$$

Dividing through by $(d_1)^2$, we have

$$F_1 = 4F_2 \text{ or } F_2 = \frac{1}{4}F_1 \quad \text{Ans. C}$$

9. **Ans. D**

10. **Ans. D** Note the following *electric power formulas:*

$$(a.) P = IV$$

$$(b.) P = I^2 R$$

$$(c.) P = V^2/R$$

$$(d.) P = E/t$$

Where

P = power (watts)

V = voltage (volts)

I = current (amperes)

R = resistance (ohms)

E = energy (joules)

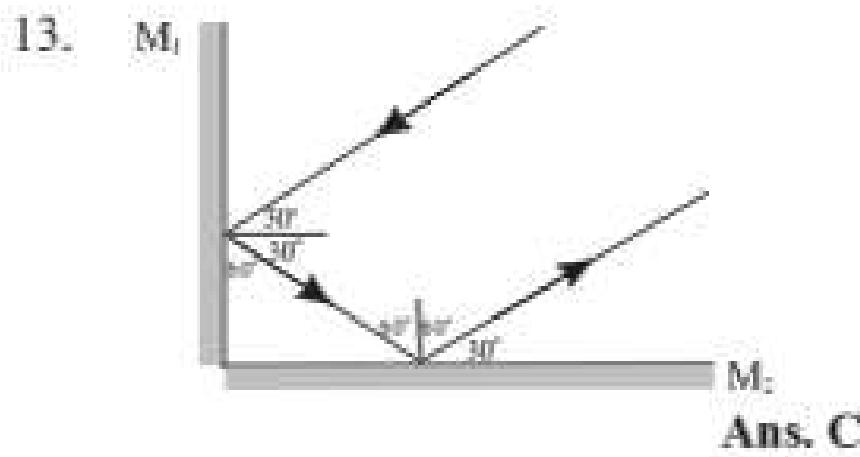
t = time (seconds)

11. The *Wet and dry bulb hygrometer* and the *Hair Hygrometer* may be used to determine the relative humidity in a physics laboratory.
Note that the manometer is used to measure pressure while the hygrometer is used to measure relative density. **Ans. B**

12. Efficiency = $\frac{MA}{VR} \times 100\%$

But $MA = \frac{L}{E} = \frac{200}{50} = 4$; $VR = 5$

Therefore, efficiency = $\frac{4}{5} \times 100\% = 80\%$ **Ans. E**



14. When an atom loses or gains a charge, it becomes an ion. **Ans. B**

15. Recall that quantity of heat (Q) is given by the product of mass, heat capacity (c) and temperature change. That is, $Q = mc(\theta_2 - \theta_1)$. But Heat gained by cold water = heat lost by hot water

$$m_{cold}c(\theta_2 - \theta_1) = m_{hot}c(\theta_2 - \theta_1)$$

Dividing through by c, we have

$$m_{cold}(\theta_2 - \theta_1) = m_{hot}(\theta_2 - \theta_1)$$

$$\frac{m_{cold}}{m_{hot}} = \frac{(\theta_2 - \theta_1)}{(\theta_2 - \theta_1)}$$

$$\frac{m_{cold}}{m_{hot}} = \frac{(75^\circ - 40^\circ)}{(40^\circ - 25^\circ)} = \frac{35}{15} = \frac{7}{3}$$

The ratio = 7:3 **Ans. C**

SUMMARY OF ANSWERS

[PHYSICS 2015/2016]

- | | | | | |
|------|------|------|------|------|
| 1.D | 2.B | 3.D | 4.D | 5.A |
| 6.D | 7.D | 8.C | 9.D | 10.D |
| 11.B | 12.E | 13.C | 14.B | 15.C |

PHYSICS 2017/2018 QUESTIONS [1]

Computer Based Test (CBT)

- The force on a current carrying conductor in a magnetic field is greatest when the
 - conductor makes an angle of 60° with the field.
 - force is independent of the angle between the field and the conductor
 - conductor is parallel with the field
 - conductor is at right angles with the field
- A moving Coil galvanometer of 300Ω resistance gives full scale deflection for 1.0mA . The resistance, R, of the shunt that is required to convert the galvanometer into a 3.0A ammeter is
 - 899.70Ω
 - 10.00Ω
 - 0.10Ω
 - 0.01Ω
- The range of wavelengths of the visible spectrum is 400nm to 700nm . The wavelength of gamma rays is
 - shorter than 700nm but longer than 400nm
 - longer than 700nm
 - shorter than 400nm
 - 550nm
- If the relative density of a metal is 19, what will be the mass of 20cm^3 of the metal when immersed in water?
 - 400g
 - 39g
 - 380g
 - 360g
- Vapour is said to be saturated when
 - more molecules return to the liquid than the amount that left it
 - a dynamic equilibrium exists between the molecules of the liquid and the vapour molecules at a given temperature
 - the vapour pressure is equal to the atmospheric pressure
 - all the molecules are moving with the same speed in all directions at a given temperature
- When a transformer has more secondary windings than primary windings, it
 - has a smaller secondary current.
 - has a greater power output.

- C. is a stepdown transformer.
D. increases the total energy output.
7. When light is incident on an object which is magenta in colour, which of the following colours would be absorbed?
A. Red and blue B. Green only
C. Red and green D. Red only
8. Which of the following statements about friction is NOT correct?
A. The force of kinetic friction is less than the force of static friction.
B. The force of kinetic friction between two surfaces is independent of the areas in contact provided the normal reaction is unchanged.
C. The angle of friction is the angle between the normal reaction and the force friction.
D. The force of rolling friction between two surfaces is less than the force of sliding friction.
9. Electrical power is transmitted at a high voltage rather than low voltage because the amount of energy loss is due to
A. heat dissipation
B. production of Eddy current
C. excessive current discharge
D. excessive voltage discharge
10. A ship traveling towards a cliff receives the echo of its whistle after 3.5 seconds. A short while later, it receives the echo after 2.5 seconds. If the speed of sound in air under the prevailing conditions is 250ms^{-1} , how much closer is the ship to the cliff?
A. 10m B. 350m
C. 175m D. 125m
11. A current-carrying conductor experiences a force when placed in a magnetic field because the
A. conductor is magnetised
B. magnetic field of the current interacts with external magnetic field
C. force is due to the motor principle
D. electric field of the current interacts with external magnetic field
12. The linear expansivity of brass is $2 \times 10^{-5}\text{C}^{-1}$. If the volume of a piece of brass is 15.00cm^3 at 0°C , what is the volume at 100°C ?
A. 16.03cm^3 B. 16.00cm^3
C. 15.09cm^3 D. 15.03cm^3
13. In a resonance tube experiment, a tube of fixed length is closed at one end and several tuning forks of increasing frequency used to obtain resonance at the open end. If the tuning fork with the lowest frequency which gave resonance had a frequency f_1 , and the next tuning fork to give resonance had a frequency f_2 , find the ratio $f_2:f_1$.
A. $\frac{1}{2}$ B. 3
C. 2 D. 8
14. I. Its velocity is constant.
II. No work is done on the body.
III. It has constant acceleration directed away from the centre.
IV. The centripetal force is directed towards the centre.
Which combination above is true of a body moving with constant speed in a circular track?
A. I and III B. I and IV
C. II and III D. II and IV
15. A machine requires 1000J of work to raise a load of 500N through a vertical distance of 1.5m. Calculate the efficiency of the machine.
A. 80% B. 75%
C. 50% D. 33%

SUCCESS QUOTE

"You will get admission to study your dream course *this year*. I can see it already. Just believe in yourself, believe in your dream, believe in what the mighty power of God can do. Then, work it out!"

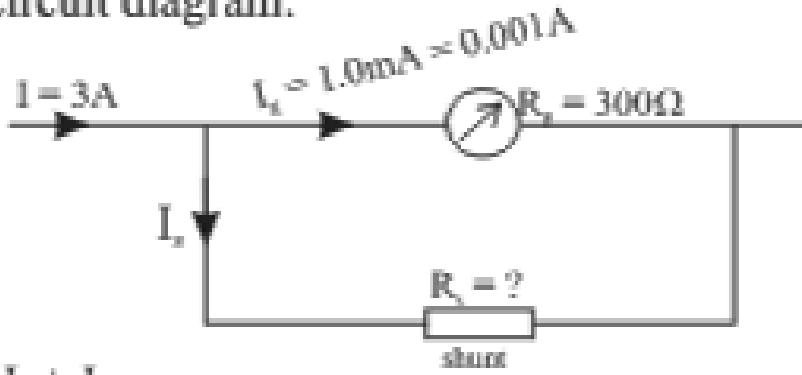
~ Henry Divine

PHYSICS 2017/2018 ANSWERS [1]

1. The force on a current carrying conductor in a magnetic field is directly proportional to the magnetic field strength, the current in the conductor and the length of the conductor. The force is greatest when the current is perpendicular to the magnetic field, and it is zero when the current flows in the direction of the magnetic field.

Ans. D

2. The circuit diagram:



$$I = I_g + I_s$$

$$3 = I_g + 0.001$$

$$I_s = 3 - 0.001 = 2.999\text{A}$$

But Voltage (across galvanometer) = Voltage (across shunt)
 $I_s R_s = I_g R_g$

$$0.001 \times 300 = 2.999 \times R_s$$

$$R_s = \frac{0.001 \times 300}{2.999} = 0.10\Omega$$

Ans. C

3. The visible spectrum is the portion of the electromagnetic spectrum that is visible to the human eye (and it is about 400nm to 700nm). Gamma rays have the shortest wavelength and represent the highest frequency and the most energetic region of the spectrum. **Ans. C**

4. Recall that relative density is the ratio of the density of a substance to that of water. Since the density of water is 1gcm^{-3} , the density of the metal in question is 19gcm^{-3} .

$$\text{mass} = \text{density} \times \text{volume} = 19\text{gcm}^{-3} \times 20\text{cm}^3 = 380\text{g}$$

Ans. C

5. Vapour is said to be saturated when a dynamic equilibrium exists between the molecules of the liquid and the vapour molecules at a given temperature. **Ans. B**

6. Note that a transformer's output voltage is greater than the input voltage if the secondary winding has more turns of wire than the primary winding. The output voltage is stepped up, and considered to be a "step-up transformer". If the secondary

winding has fewer turns than the primary winding, the output voltage is lower and that is considered to be a "step-down transformer".
For a transformer, however, voltage and current are stepped in opposite directions, one up and the other down.

Ans. A

7. To answer this question (and any other similar question), always rely on your understanding of the three primary colors of light (red, green and blue) and the three secondary colors of light (magenta, yellow and cyan). Consider white light to consist of the three primary colors of light - red, green and blue. If white light is shining on an object, then red, green and blue light are shining on the object. If the object absorbs green light (for instance), then only red and blue light will be reflected from the it. Red and blue light striking your eye always gives the appearance of magenta.

Ans. B

8. **Ans. C**

For more details, see the Bonus Tip at the end of PHYSICS 2017/2018 ANSWERS [2].

9. Electricity is transmitted from power stations to consumers through the wires and cables of the National Grid. When a current flows through a wire some energy is lost as heat. The higher the current, the more heat is lost. To reduce these losses, the National Grid transmits electricity at a low current. This needs a high voltage.

Ans. A

10. Note that it is the reflection of sound waves from a plane barrier that gives rise to an echo. If the waves originating at a source are reflected back from a barrier which is at a distance d from the source after time t seconds, the time taken for the original wave to travel from the source to the barrier is $t/2$ seconds and the *velocity of the wave* is $\frac{d}{(t/2)}$ or $\frac{2d}{t}$.

From the question, time = $3.5 - 2.5 = 1\text{sec}$.

distance = (velocity x time) $\div 2$.

$$= (250 \times 1) \div 2 = 125\text{m}$$

Ans. D

11. A current-carrying conductor experiences a force when placed in a magnetic field because the current carrying conductor has its own magnetic field which interacts with external magnetic field to either attract or repel, thereby exerting a force.

Ans. B

12. Note that *cubic expansivity* = $3 \times$ *linear expansivity*.
From the question, $\alpha = 2 \times 10^{-5} \text{ }^{\circ}\text{C}^{-1}$,
 $v_1 = 15.00 \text{ cm}^3$, $v_2 = ?$ $T_1 = 0^{\circ}\text{C}$, $T_2 = 100^{\circ}\text{C}$.
 $v_2 - v_1 = Yv_1(T_2 - T_1)$
 $v_2 - v_1 = (3\alpha)v_1(T_2 - T_1)$
 $v_2 - 15 = (3 \times 2 \times 10^{-5}) \times 15(100 - 0)$
 $v_2 = (6 \times 10^{-5}) \times 15(100) + 15 = 6 \times 15 \times 10^{-5} + 15$
 $= 0.09 + 15 = 15.09 \text{ cm}^3$ **Ans. C**

13. One of the key points to note about resonance tube experiments is that the frequency of the overtones are odd multiples of the fundamental frequency (i.e. $3f_0$, $5f_0$, $7f_0$, ...). So, if $f_1 = f_0$ and $f_2 = 3f_0$, then the ratio $f_2:f_1 = 3f_0:f_0 = 3$.
Ans. B

14. A body moving with constant speed in a circular track is said to be undergoing a *uniform circular motion*. As the body moves in the circle,
i. it is constantly changing its direction.
ii. it is accelerating due to its change in direction. The direction of the acceleration is inwards.
iii. the net force acting upon it is directed towards the center of the circle and is otherwise referred to as an inward or centripetal force.
Ans. D

15. Work input = 1000J,
Work output = load \times dist = $500 \times 1.5 = 750\text{J}$
efficiency = $\frac{\text{work output}}{\text{work input}} \times 100\%$
= $\frac{750}{1000} \times 100\% = 75\%$
Ans. B

SUMMARY OF ANSWERS [PHYSICS 2017/2018 (1)]

1.D	2.C	3.C	4.C	5.B
6.A	7.B	8.C	9.A	10.D
11.B	12.C	13.B	14.D	15.B

SUCCESS QUOTE

"When it comes to success, the choice is simple. You can stand up and be counted, or lie down and be counted."

– Maggie L Walker

PHYSICS 2017/2018 QUESTIONS [2]

Computer Based Test (CBT)

1. A 24V potential difference is applied across a parallel combination of four 6-ohm resistors. The current in each resistor is
A. 1A B. 4A C. 16A
D. 18A E. 36A
2. In which of the following arrangements is the wavelength in an increasing order?
A. Gamma rays, infrared rays, x-rays, radio waves.
B. Gamma rays, x-rays, infrared rays, radio waves.
C. Radio waves, x-rays, gamma rays, infrared rays.
D. Infrared rays, radio waves, x-rays, gamma rays.
3. A galvanometer of resistance 20 is to be provided with a shunt such that $1/10$ of the whole current in a circuit pass through the galvanometer. The resistance of the shunt is
A. 2.00 B. 2.22 C. 18.00 D. 18.22
4. An inclined plane which makes an angle of 30° with the horizontal has a velocity ratio of
A. 2 B. 1 C. 0.866 D. 0.50
5. A 20kg mass is to be pulled up in a slope inclined at 30° to the horizontal. If the efficiency of the plane is 75%, the force required to pull the load up the plane is.... ($g = 10\text{m/s}^2$).
A. 13.3N B. 73.5N C. 133.3N D. 533.2N
6. If a room is saturated with water vapour, the temperature of the room must be
A. at 0°C . B. above the dew point.
C. at 100°C . D. below or at the dew point.
7. The refractive index of a liquid is 1.5. If the velocity of light in vacuum is $3.0 \times 10^8 \text{ ms}^{-1}$, the velocity of light in the liquid is....
A. $1.5 \times 10^8 \text{ ms}^{-1}$ B. $2.0 \times 10^8 \text{ ms}^{-1}$
C. $3.0 \times 10^8 \text{ ms}^{-1}$ D. $4.5 \times 10^8 \text{ ms}^{-1}$
E. $9.0 \times 10^8 \text{ ms}^{-1}$
8. Which of the following quantities are scalars?
I. Electrical potential II. Torque
III. Momentum IV. Kinetic energy
A. II and III only B. I and II only
C. III and IV only D. I and IV only

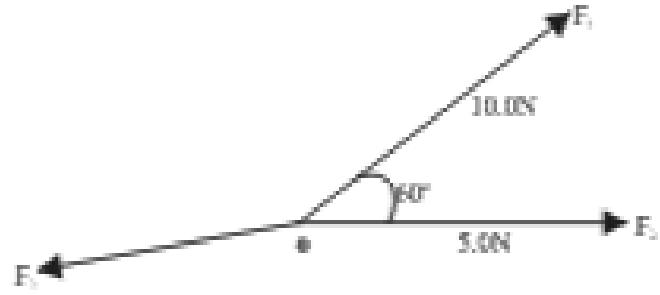
9. A block of ice floats on water inside a container. If the block of ice gets completely melted, the level of water in the container will

- A. increase B. remain the same
- C. decrease D. first decrease and then increase

10. Thermal equilibrium between two objects exists when

- A. the temperatures of both objects are equal
- B. the quantity of heat in both objects is the same
- C. the heat capacities of both objects are the same
- D. one object loses heat continuously to the other

11.



In the figure above, the three forces F_1 , F_2 , F_3 acting at O are in equilibrium. If the magnitude of F_1 is 10.0N and the magnitude of F_2 is 5.0N, find the magnitude of F_3 .

- A. 26.4N B. 15.0N
- C. 13.2N D. 10.0N

12. 22,000J of heat is required to raise the temperature of 1.5kg of paraffin from 20°C to 30°C. Calculate the specific heat capacity of paraffin.

- A. 1466J $\text{Kg}^{-1}\text{C}^{-1}$ B. 2933J $\text{Kg}^{-1}\text{C}^{-1}$
- C. 4400J $\text{Kg}^{-1}\text{C}^{-1}$ D. 5866J $\text{Kg}^{-1}\text{C}^{-1}$

13. When white light is dispersed by a spectrometer, the component having the shortest wavelength is

- A. orange B. green C. violet D. red

14. An Object is placed 5.6×10^{-4} m in front of a converging lens of focal length 1.0×10^{-3} m. The image formed is

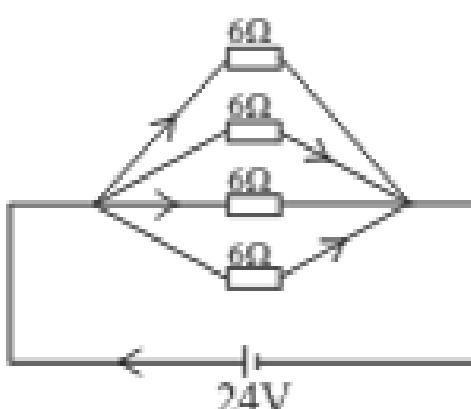
- A. real, erect and magnified
- B. virtual, erect and magnified
- C. real, inverted and magnified
- D. virtual, erect and diminished

15. A bar magnet is most effectively demagnetized by

- A. placing it in a N - S position and hitting it with a hammer
- B. subjecting it to an electric current from a battery
- C. bringing its north pole in contact with the north pole of a very strong magnet
- D. heating the magnet

PHYSICS 2017/2018 ANSWERS [2]

1.



$$\begin{aligned} \text{Using Ohm's law, } \\ V &= IR \\ I &= V \div R \\ &= 24 \div 6 \\ &= 4 \text{ A} \end{aligned}$$

Ans. B

2. The electromagnetic spectrum includes, in order of increasing wavelengths: gamma rays, X-rays, ultraviolet radiation, visible light, infrared radiation, microwaves, radio waves.

Ans. B

3. From the question, $R_s = 20$.

If the whole current in the circuit is I , then $I_s = \frac{I}{10}$ and $I_s = \frac{9I}{10}$. We are required to find R_s . For the circuit, $V_s = V$.

$$\begin{aligned} I_s R_s &= I_s R_s \\ \frac{9V}{10} \times R_s &= \frac{V}{10} \times 20 \\ R_s &= \frac{20}{9} = 2.22 \Omega \end{aligned}$$

Ans. B

4. For inclined planes, $V.R = \frac{1}{\sin\theta} = \frac{1}{\sin 30} = 2$

Ans. A

5. From the question, $m = 20\text{kg}$
 $L = (20 \times 10) = 200\text{N}$, Eff. = 75%, E = ?

$$\text{Eff.} = \frac{\text{MA}}{\text{VR}} \times 100\% = \frac{\frac{L}{E}}{\frac{1}{\sin\theta}} \times 100\%$$

$$\text{Eff.} = \frac{L \sin\theta}{E} \times 100\%$$

$$E = \frac{L \sin\theta}{\text{Eff.}} \times 100\% = \frac{200 \sin 30}{75} \times 100\%$$

$$E = 133.3\text{N}$$

Ans. C

6. The *dew point* is the temperature to which air must be cooled to become saturated with water vapour. When further cooled, the airborne water vapour will condense to form liquid water (dew).

Ans. D

7. The absolute refractive index (n) of a medium is

$$n = \frac{\text{velocity of light in vacuum}}{\text{velocity of light in the medium}}$$

$$\therefore \text{velocity of light} = \frac{\text{velocity of light in vacuum}}{n}$$

$$= \frac{3.0 \times 10^8}{1.5} = 2 \times 10^8 \text{ ms}^{-1}$$

Ans. B

8. Note that scalars are quantities that are fully described by a magnitude or numerical value alone (unlike vectors that require both a magnitude and a direction to be fully described). For this question and other similar questions, this is how to analyze the quantities given:

Momentum equals mass times velocity, and velocity is a vector quantity while mass is a scalar quantity. A scalar multiplied by a vector is a vector.

Kinetic energy is a product of mass and the square of the velocity. The standard square or dot-product of a vector is a scalar.

Electric potential equals electric potential energy per unit charge. Since both the electric potential energy and charge are scalars, electric potential is also scalar.

Torque = $F \times r \times \sin\theta$. So, it's a vector.

Ans. D

9. In the first state, we have a block of ice of mass m floating in the water. If it is floating (in equilibrium), it will have to displace enough water to support its weight. The amount of water displaced is the volume = m/d , where m is the mass of the block of ice, and d is the density of water.

In the second state, where the ice has melted, it turns into water of volume = m/d (exactly the same volume as it displaced before). So the added volume is the same, so the level of the water will not change.

Ans. B

10. Thermal equilibrium is the condition under which two objects in physical contact with each other exchange no heat energy because they are at the same temperature.

Ans. A

11. Using the parallelogram law of forces,



$$F_3^2 = F_1^2 + F_2^2 - 2F_1F_2\cos 120^\circ$$

$$F_r = \sqrt{10^2 + 5^2 - (2 \times 10 \times 5 \times -0.5)}$$

$$= 13.23\text{N}$$

Ans. C

12. Quantity of heat, $Q = mc(\theta_i - \theta_f)$

$$22,000 = 1.5 \times c \times (30 - 20)$$

$$c = \frac{22,000}{1.5 \times 10} = 1466.667 \text{ J Kg}^{-1}\text{C}^{-1}$$

Ans. A

13. When white light is spread apart by a spectrometer, the colours of the visible spectrum appear. The colours vary according to their wavelengths. Violet has the highest frequencies and shortest wavelengths, and red has the lowest frequencies and the longest wavelengths.

Ans. C

14. Since the object is closer to the lens than the focal length, the image formed is virtual, erect and magnified.

Ans. B

15. Note that a magnet can be made to lose its magnetism by

- heating the magnet to redness and allowing it to cool while lying in the E-W direction.
- placing the magnet in the E-W direction and hammering hard on it
- placing the magnet in the E-W direction in a solenoid, passing an alternating current through the solenoid, and then slowly withdrawing the bar from the solenoid to a long distance.

Ans. D

SUMMARY OF ANSWERS [PHYSICS 2017/2018 (2)]

1.B	2.B	3.B	4.A	5.C
6.D	7.B	8.D	9.B	10.A
11.C	12.A	13.C	14.B	15.D

DON'T FORGET

Life is spiritual.

If you patronize or prepare with any pirated form of this book instead of buying the original, the author's sweat will perpetually speak against your dreams and aspirations.

12 important points to note

1. When the temperature of a liquid is increased, the surface tension would decrease.
2. If a sound wave travels from a cold-air region to a hot-air region, the wavelength of the sound would decrease.
3. When the final image of an astronomical telescope is at infinity, it is said to be in *normal adjustment*.
4. When light moves from a dense medium to a less dense medium, *total internal reflection* takes place.
5. The number of electrons in the conduction band of a pure semiconductor is equal to the number of holes in the valence band.
6. Ordinarily, gases are considered to be electrical insulators. However, they can be made to conduct electricity by subjecting them to *low pressure and high voltage* (or current).
7. The efficiency of any machine is always less than 100%. The reason is because the velocity ratio is always greater than the mechanical advantage.
8. The terrestrial telescope has one extra lens more than the astronomical telescope. The work of the extra lens is to re-invert the image so that it is upright or erect.
9. Absolute thermometers are thermometers that are calibrated numerically by the thermodynamic absolute temperature scale. The thermometric substance of an absolute thermometer is mercury.
10. The *electrophorus* is an instrument used for securing large number of similar charges by induction.
11. A magnetic field is said to exist at a point if a force is exerted on a moving charge at that point.
12. In a nuclear reactor, the particle that is responsible for nuclear fission is the neutron.

BEST WISHES

PHYSICS 2018/2019 QUESTIONS

Instruction: There are 17 Questions in this section.
You are expected to answer 15 Questions only.

1. If a man is standing between two parallel plane mirrors with their reflecting surfaces facing each other, how many images of the man will be formed?
A. 8 B. 2 C. 4 D. Infinite
2. In the Hare's apparatus, water rises to a height of 26.5 cm in one limb. If a liquid rises to a height of 20.4 cm in the other limb, what is relative density of the liquid?
A. 0.8 B. 1.1 C. 1.2 D. 1.3
3. A p-n junction diode is used as
**A. a rectifier in a d.c circuit
B. an amplifier in an a.c circuit
C. a rectifier in an a.c circuit
D. an amplifier in a d.c circuit**
4. The sharpness of the boundary of the shadow of an object is determined by the
**A. rays of light passing through the object
B. intensity of light striking the object
C. opacity of the object
D. nature of the object**
5. A body of mass 4kg is acted on by a constant force of 12N for 3 seconds. The kinetic energy gained by the body at the end of the time is
A. 162J B. 144J C. 72J D. 81J
6. Two inductors of inductances 4H and 8H are arranged in series and a current of 10A is passed through them. What is the energy stored in them?
**A. 500J B. 50J
C. 133J D. 250J**
7. Which of the following will be applied when a metal Y is used to electroplate another metal X in electrolysis?
**A. Y is the anode and very high current is used
B. X is the anode and Y is the cathode
C. Y is the cathode and X is the anode
D. X is the anode and very high current is used**
8. If a tube of small radius opened at both ends is placed in a liquid, the liquid will
A. fall below the liquid level if the liquid does not wet the glass

- B. rise above the liquid level if the liquid does not wet the glass
C. remain at the same level irrespective of whether the liquid wets the glass or not
D. fall below the liquid level if the liquid wets the glass
9. A stone and a feather are dropped from the same height above the earth surface. Ignoring air resistance, which of the following is correct?
A. The feather will be blown away by the wind while the stone will drop steadily
B. The stone and feather will both reach the ground at the same time
C. The feather will reach the ground first
D. The stone will reach the ground first
10. An air bubble rises from the bottom to the top of a water dam which is 40 m deep. The volume of the bubble just below the surface is 2.5 cm^3 . Find its volume at the bottom of the dam, if atmospheric pressure is equivalent to 10 m of water.
A. 2.0 cm^3 B. 1.6 cm^3
C. 0.625 cm^3 D. 0.5 cm^3
11. When equal weights of iron and water are subjected to an equal supply of heat, it is found that the piece of iron becomes much hotter than water after a shorter time because
A. the specific heat of iron is higher than that of water
B. iron is in solid form
C. water is in liquid form
D. the specific heat of water is higher than that of iron
E. the specific heat of iron is infinite
12. Of two identical tuning forks with natural frequency 256Hz, one is loaded so that 4 beats per second are heard when they are sounded together. What is the frequency of the loaded tuning fork?
A. 260Hz B. 252Hz
C. 248Hz D. 264Hz
13. Radio waves have a velocity of $3 \times 10^8 \text{ m/s}$. A radio station sends out a broadcast on a frequency of 800KHz. The wavelength of the broadcast is
A. 240.0m B. 267.0m C. 375.0m
D. 37.5m E. 26.7m
14. A narrow beam of white light can be split up into different colours by a glass prism. The correct explanation is that
A. white light is an electromagnetic wave
B. the prism has all the colours of the white light
C. white light has undergone total internal reflection in the prism
D. different colours of white light travel with different speeds in glass
15. Two forces whose resultant is 100N, are at right angles to each other. If one of them makes an angle of 30° with the resultant, determine its magnitude.
A. 8.66N B. 50.0N
C. 57.7N D. 86.6N
16. A conductor of length 2 m carries a current of 0.8 A while kept in a magnetic field of magnetic flux density 0.5 T. The maximum force acting on it is
A. 8.0 N B. 3.2 N
C. 0.8 N D. 0.2 N
17. A heavy object is suspended from a string and lowered into water so that it is completely submerged. The object appears lighter because
A. the density of water is less than that of the object
B. the pressure is low just below the water surface
C. it experiences an upthrust
D. the tension in the string neutralizes part of the weight

SUCCESS QUOTE

“In life, there are two groups of people that expect something from you. The first group are those looking up to you, the second are those who look down on you. It's left for you to choose which group you want to meet their expectation. The ball is in your court.”

~ Aden Olisa

PHYSICS 2018/2019 ANSWERS

1. No of images formed, $n = \left(\frac{360}{\theta}\right) - 1$

For two parallel mirrors, $\theta = 0^\circ$; $n = \frac{360}{0} - 1$
 $n = \alpha - 1 = \alpha$ [D]

Compare with Question no 8 of year 2007/2008.

2. Relative density = $\frac{\text{density of liquid}}{\text{density of water}} = \frac{\text{height of water}}{\text{height of liquid}}$

Rel. density = $\frac{26.5}{20.4} = 1.299$ [D]

3. The conversion of alternating current (a.c) into direct current (d.c) is known as rectification. A p-n junction diode allows electric current when it is forward biased and blocks electric current when it is reverse biased. This action of p-n junction diode enables us to use it as a rectifier. [C]

4. [B]

5. $F = ma = \frac{mv}{t}$

$\therefore v = \frac{Ft}{m} = \frac{12 \times 3}{4} = 9 \text{ m/s}$

K.E = $\frac{1}{2}mv^2 = \frac{1}{2} \times 4 \times 92 = 162 \text{ J.}$ [A]

6. Effective inductance, L is obtained as follows:

$$\frac{1}{L} = \frac{1}{L_1} + \frac{1}{L_2} = \frac{1}{4} + \frac{1}{8} = \frac{2+1}{8} = \frac{3}{8}$$

$$L = \frac{8}{3} \text{ H}$$

$$\text{Energy stored} = \frac{1}{2}LI^2 = \frac{1}{2} \times \frac{8}{3} \times \frac{1}{3} \times 10 \times 10 \\ = \frac{400}{3} = 133.3 \text{ J} \quad [\text{C}]$$

7. During electrolysis, metals and hydrogen are normally deposited at the cathode while non-metals and oxygen are deposited on the anode. If a metal Y is to be used to electroplate another metal X, metal Y will form the anode which would be deposited at the cathode made of X. [A]

8. The tube of small radius opened at both ends is a capillary tube. If the liquid wets glass, it will rise up the capillary. If the liquid does not wet glass, it will fall below its initial level. [A]

9. If we ignore air resistance, which naturally affects the feather more than the stone, option A cannot

be the answer. Next, we note that in a free fall, acceleration due to gravity is independent of the mass of the bodies involved. Therefore, the stone and feather will both reach the ground at the same time. [B]

10. $V_1 = 2.5 \text{ cm}^3, V_2 = ?, P_1 = 10 \text{ m},$

$P_2 = P_1 + 10 = 40 + 10 = 50 \text{ m}$

At constant Temperature, $P_1V_1 = P_2V_2$

This implies that $V_2 = \frac{P_1V_1}{P_2} = \frac{10 \times 2.5}{50} = 0.5 \text{ cm}^3$ [D]

11. Specific heat of a substance is the quantity of heat required to raise the temperature of a unit mass of the substance by 1 Celsius degree. Substances with higher specific heat value require more heat to raise their temperature (by 1°C) than those with lower specific heat. If the piece of iron becomes much hotter than water for the same amount of heat, it is because the specific heat of water is higher than that of iron. [D]

12. Beat = $F_2 - F_1$

$4 = F_2 - 256$

$F_2 = 4 + 256 = 260 \text{ Hz}$ [A]

13. For waves,

velocity (v) = frequency (f) x wavelength (λ)

i.e. $v = f\lambda$, where $v = 3 \times 10^8$, $f = 800 \text{ KHz}$.

$$3 \times 10^8 = 800 \times 10^3 \times \lambda$$

$$\therefore \lambda = (3 \times 10^8) \div (800 \times 10^3)$$

$$\lambda = 375 \text{ m}$$
 [C]

14. Dispersion of light is the splitting of white light when it passes through a glass prism into its constituent spectrum of colours (i.e. violet, indigo, blue, green, yellow, orange and red). The white light splits into its constituent colours at various frequencies and various angles. [D]

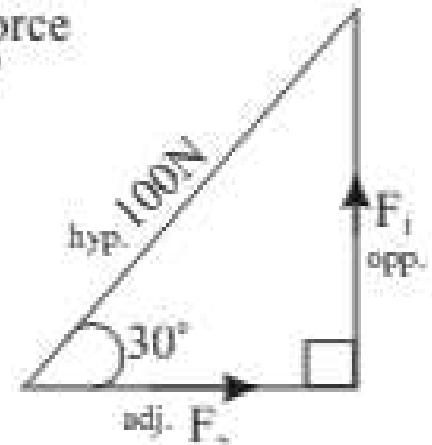
15. From the diagram, the force F_2 makes an angle of 30° with the resultant.

Using $\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$$\cos 30 = \frac{F_1}{100}$$

$$100 \cos 30 = F_1$$

$$100 \times 0.866 = F_1; F_1 = 86.6$$
 [D]



16. The magnetic force on a current carrying conductor in a magnetic field is given by:

$$F = ILB \sin \theta$$

The force is maximum when θ is 90° . In that case, $F = ILB$

$$F = 0.8 \times 2 \times 0.5 = 0.8 \text{ N} [C]$$

17. Water (and any other fluid) will exert a force upward if an object is partly or wholly submerged within it. This upward force which accounts for the apparent loss or reduction in the weight of the object is called *upthrust*. [C]

SUMMARY OF ANSWERS [PHYSICS 2018/2019]

- | | | | | | |
|------|------|------|------|------|------|
| 1.D | 2.D | 3.C | 4.B | 5.A | 6.C |
| 7.A | 8.A | 9.B | 10.D | 11.D | 12.A |
| 13.C | 14.D | 15.D | 16.C | 17.C | |

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PHYSICS 2019/2020 QUESTIONS

Instruction: There are 17 Questions in this section.
You are expected to answer 15 Questions only.

1. If a charged ion goes through combined electric and magnetic fields, the resultant emergent velocity of the ion is:
 A. $E + B$ B. EB
 C. $E - B$ D. $E - B$
2. Which of the following pairs of light rays shows the widest separation in the spectrum of white light?
 A. Blue and red B. Green and yellow
 C. Indigo and violet D. Orange and red
3. The maximum kinetic energy of the photoelectrons emitted by a metal surface is 0.34eV. If the work function of the metal surface is 1.83eV, find the stopping potential.
 A. 2.17V B. 1.49V C. 1.09V D. 0.34V
4. The change in volume when 450kg of ice is completely melted is
 A. 0.05m^3 B. 0.45m^3
 C. 4.50m^3 D. 0.50m^3
[density of ice = 900kgm^{-3} ; density of water = 1000kgm^{-3}]
5. A silicon material is doped with an element of a certain group and an n-type semiconductor is formed. The most likely group of the element is
 A. II B. I C. V D. III
6. A student is at a height 4m above the ground during a thunderstorm. Given that the potential difference between the thundercloud and the ground is 10^7V , the electric field created by the storm is
 A. $2.0 \times 10^6 \text{ NC}^{-1}$ B. $2.5 \times 10^6 \text{ NC}^{-1}$
 C. $1.0 \times 10^7 \text{ NC}^{-1}$ D. $4.0 \times 10^7 \text{ NC}^{-1}$
7. A coin placed below a rectangular glass block of thickness 9 cm and refractive index 1.5 is viewed vertically above the block. The apparent displacement of the coin is
 A. 8 cm B. 6 cm C. 5 cm D. 3 cm
8. A transistor is used in the amplification of signals because it
 A. allows doping
 B. contains electron and hole carriers
 C. consumes a lot of power
 D. controls the flow of current
9. A test tube of radius 1.0cm is loaded to 8.8g. If it is placed upright in water, find the depth to which it would sink. [$g = 10\text{ms}^{-2}$; density of water = 1000kgm^{-3}]
 A. 2.8 cm B. 5.2 cm
 C. 25.5 cm D. 28.0 cm

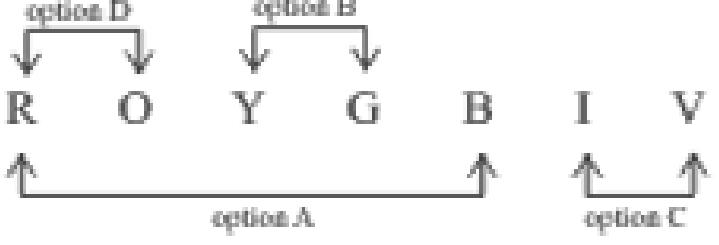
10. Metal rods of length 20m each are laid end to end to form a bridge at 25°C. What gap will be provided between consecutive rails for the bridge to withstand 75°C? [Linear expansivity of the material = $2.0 \times 10^{-5} \text{K}^{-1}$]
A. 0.22m B. 0.25m
C. 0.02m D. 0.20m
11. A person can focus objects when they lie beyond 75cm from his eyes. The focal length of the lens required to reduce his least distance of distinct vision is 25cm is
A. 25.00cm B. 37.50cm
C. 75.00cm D. 18.75cm
12. The blade of a hoe feels colder to touch in the morning than the wooden handle because the
A. handle is a better conductor of heat than the blade
B. handle contains stored energy in the form of heat
C. blade is a better conductor of heat than the handle
D. blade is placed at a lower temperature than the handle
13. A shooter wants to fire a bullet in such a way that its horizontal range is equal to three times its maximum height. At what angle should he fire the bullet to achieve this?
A. 68° B. 53° C. 30° D. 45°
14. The instrument that measures both a.c and d.c is
A. a current balance B. a moving coil ammeter
C. an inverter D. a moving iron ammeter
15. A car accelerates uniformly from rest at 4ms^{-2} . How far will it travel in the fifth complete second?
A. 100m B. 50m C. 32m D. 18m
16. An electric lamp marked 240V, 60W is left to operate for an hour. How much energy is generated by the filament?
A. $3.86 \times 10^3 \text{J}$ B. $3.56 \times 10^3 \text{J}$
C. $1.80 \times 10^3 \text{J}$ D. $2.16 \times 10^3 \text{J}$
17. In Faraday's law of electrolysis, a graph of mass deposited against the quantity of electricity is plotted. The slope of the graph gives
A. the energy released
B. the electrochemical equivalent
C. the current flowing
D. the charge released

SUCCESS QUOTE

"Successful and unsuccessful people do not vary greatly in their *abilities*. They vary in their *desires* to reach their potential."

- John Maxwell

PHYSICS 2019/2020 ANSWERS

1. The force acting on a charged particle in an electric field is given by, $F = EQ$ ----- (i)
The force on a moving charge in a magnetic field is given by, $F = BQv$ ----- (ii)
To obtain the resultant velocity, we equate (i) and (ii)
 $EQ = BQv$, or $E = Bv$
 $v = \frac{E}{B}$ [A]
2. We shall use the acronym for the sequence of colours in the light spectrum: ROYGBIV.

- From the diagram above, we observe that the widest separation is given by Red and Blue. [A]
3. Stopping potential is defined as the potential necessary to stop any photo-emitted electron (even the one with the most kinetic energy) from reaching the other side. The relation that holds for stopping potential (V_s) is $eV_s = K.E_{max}$ where e is the electronic charge and V_s is the stopping potential.
 $eV_s = K.E_{max}$
 $V_s = \frac{K.E_{max}}{e} = \frac{0.34 \times 1.6 \times 10^{-19}}{1.6 \times 10^{-19}} = 0.34V$. [D]
4. Recall that density = $\frac{\text{mass}}{\text{volume}}$ Or volume = $\frac{\text{mass}}{\text{density}}$
Vol of ice = $\frac{\text{mass}}{\text{density of ice}} = \frac{450}{900} = 0.500\text{m}^3$
Vol of water = $\frac{\text{mass}}{\text{density of water}} = \frac{450}{1000} = 0.450\text{m}^3$
Change in volume = $0.500 - 0.450 = 0.05\text{m}^3$ [A]
5. Doping is the intentional introduction of impurities into an intrinsic semiconductor for the purpose of modulating its electrical, optical and structural properties. The doped material is referred to as an extrinsic semiconductor.
Impurity atoms with 5 valence electrons produce n-type semiconductors by contributing extra electrons. Impurity atoms with 3 valence electrons produce p-type semiconductors by producing a hole or electron deficiency. [C]
6. We are required to find the electric field intensity, E .
 $E = \frac{V}{d} = \frac{10}{4} = 2.5 \times 10^3 \text{NC}^{-1}$ [B]

7. From the question,

Real depth = thickness of the glass block = 9 cm

Refractive index of the glass block = 1.5

But refractive index = $\frac{\text{real depth}}{\text{apparent depth}}$

$$1.5 = \frac{9}{\text{apparent depth}}$$

$$\text{Therefore, apparent depth} = \frac{9}{1.5} = 6 \text{ cm}$$

$$\text{Apparent displacement of the coin} = 9 - 6 = 3 \text{ cm } [\text{A}]$$

8. A transistor is a device used to amplify or switch electronic signals and electrical power. The basic idea behind a transistor is that it lets you *control the flow of current* through one channel by varying the intensity of a much smaller current that is flowing through a second channel. [D]

9. Let's work on getting a suitable formula for this.

$$\text{From Pressure} = \frac{F}{A}, F = P \times A$$

That is,

Force exerted by the loaded test tube

= Pressure \times cross-sectional area

i.e. $F = \rho gh \times A$ [where ρ = density, g = 10 ms^{-2} , h = depth]

$$h = \frac{F}{A \times \rho g} = \frac{mg}{\pi r^2 \times \rho g} = \frac{m}{\pi r^2 \times \rho}$$

$$\text{From the question, } m = 8.8 \text{ g} = 8.8 \times 10^{-3} \text{ kg}; \\ r = 1 \text{ cm} = 1 \times 10^{-2} \text{ m}; \rho = 1000 \text{ kg m}^{-3}$$

$$h = \frac{8.8 \times 10^{-3}}{\pi \times (10^{-2})^2 \times 1000} = \frac{8.8 \times 10^{-3}}{\pi \times 10^{-4} \times 10^3} \\ = \frac{8.8}{\pi} \times 10^{-2} = 2.8 \times 10^{-2} \text{ m or } 2.8 \text{ cm } [\text{A}]$$

10. From the question,

$$l_1 = 20 \text{ m}, \theta_1 = 25^\circ \text{C}, \theta_2 = 75^\circ \text{C}, \alpha = 2.0 \times 10^{-5} \text{ K}^{-1}$$

The required gap is the change in length at 75°C .

Using $l_2 - l_1 = \alpha l_1 (\theta_2 - \theta_1)$,

$$l_2 - l_1 = 2.0 \times 10^{-5} \times 20 \times (75 - 25) \\ = 40 \times 10^{-5} \times 50 = 2000 \times 10^{-5} = 0.02 \text{ m } [\text{C}]$$

11. This question is a bit tricky and if care is not taken, candidates may commit some blunders here. From the question, the required least distance of distinct vision = 25cm.

For the person in question to see an object clearly at a distance of 25cm from the eye, the image must be formed at 75cm on the same side of the lens.

This implies that, $u = 25 \text{ cm}$; $v = -75 \text{ cm}$ (negative because the image should be virtual), $f = ?$

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f} \Rightarrow f = \frac{uv}{u+v} = \frac{25 \times -75}{25 + (-75)}$$

$$= \frac{25 \times -75}{-50} = \frac{-1875}{-50} = 37.50 \text{ [B]}$$

12. The blade of a hoe feels colder to touch in the morning than the wooden handle because the blade is a better conductor of heat than the handle. [C]

$$13. \text{Horizontal range} = \frac{U^2 \sin 2\theta}{g}; \text{Maxi. height} = \frac{U^2 \sin^2 \theta}{2g}$$

Horizontal range = $3 \times$ Maximum height

$$\frac{U^2 \sin 2\theta}{g} = \frac{3 \times U^2 \sin^2 \theta}{2g} \Rightarrow \sin 2\theta = \frac{3 \sin^2 \theta}{2}$$

$$\text{But } \sin 2\theta = 2 \sin \theta \cos \theta \Rightarrow \frac{3 \sin^2 \theta}{2} = 2 \sin \theta \cos \theta$$

$$\Rightarrow 4 \sin \theta \cos \theta = 3 \sin^2 \theta \Rightarrow 4 \cos \theta = 3 \sin \theta$$

$$\frac{\sin \theta}{\cos \theta} = \frac{4}{3} = 1.3333 \quad \left[\text{But } \frac{\sin \theta}{\cos \theta} = \tan \theta \right]$$

$$\Rightarrow \tan \theta = 1.333$$

$$\theta = \tan^{-1}(1.333) = 53^\circ \text{ [B]}$$

14. Moving iron ammeters use a piece of iron which moves when acted upon by the electromagnetic force of a fixed coil of wire. This type of meter responds to both direct and alternating currents (as opposed to coil ammeter, which works on direct current only). [D]

15. $u = 0, a = 4 \text{ ms}^{-2}, s = ?, t = 5 \text{ th complete second}$.

From $s = ut + \frac{1}{2}at^2$,

we have $s = \frac{1}{2}at^2$ [since $u = 0$]

If s_4 and s_5 are the distances covered in 4secs and 5secs respectively, then

$$s_4 = \frac{1}{2} \times 4 \times 4^2 = 2 \times 16 = 32 \text{ m.}$$

$$s_5 = \frac{1}{2} \times 4 \times 5^2 = 2 \times 25 = 50 \text{ m.}$$

Distance covered in the fifth second = $s_5 - s_4$

$$= 50 - 32 = 18 \text{ m } [\text{D}]$$

16. Energy generated = power \times time

$$= 60 \text{ W} \times 1 \text{ h} = 60 \times 60 \times 60 \text{ Ws}$$

$$= 216000 \text{ J} = 2.16 \times 10^5 \text{ J } [\text{D}]$$

17. Faraday's law of electrolysis states the mass of substance deposited is directly proportional to the quantity of electrical charge passed through the electrolyte. Mathematically, $M \propto Q$.

A graph of M against Q is a straight line passing through the origin with slope equal to Z (The electrochemical equivalent). [B]

SUMMARY OF ANSWERS [PHYSICS 2019/2020]

1.A	2.A	3.D	4.A	5.C	6.B
7.A	8.D	9.A	10.C	11.B	12.C
13.B	14.D	15.D	16.D	17.B	

CHEMISTRY

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CHEMISTRY 2005/2006 QUESTIONS

1. Which of the following is a mixture?

- A. Sodium chloride
- B. Sea water
- C. Iron filings
- D. Granulated sugar

2. Two elements, X and Y, have atomic numbers 8 and 13 respectively. The formula for the possible compound found between X and Y is

- A. Y_2X_3
- B. XY_2
- C. X_2Y_3
- D. X_3Y_2

3. 3 g of a mixture of CaO and CaCO_3 was heated to a constant mass. If 0.44 g of CO_2 was liberated, calculate the percentage of CaO in the mixture.

- A. 33.3%
- B. 50%
- C. 66.67%
- D. 25%

4. An alkanoic acid has a molecular mass of 88. Its molecular formula is

- A. $\text{C}_4\text{H}_9\text{COOH}$
- B. $\text{C}_5\text{H}_{11}\text{COOH}$
- C. $\text{C}_3\text{H}_7\text{COOH}$
- D. $\text{C}_6\text{H}_5\text{COOH}$

5. If the rate of diffusion of oxygen is taken as $1\text{cm}^3\text{s}^{-1}$, what will be the rate of diffusion of methane whose relative molecular mass is 16?

- A. 2.0
- B. 1.8
- C. 1.4
- D. 1.0

6. An increase in temperature causes an increase in the pressure of a gas in a fixed volume due to an increase in the

- A. Number of molecules of the gas
- B. Density of the gas molecules
- C. Number of collisions between the gas molecules
- D. Number of collisions between the gas molecules and the walls of the container

7. In electrolysis, the chemical reaction which takes place at the anode is

- A. dissociation
- B. hydrolysis
- C. oxidation
- D. reduction

8. In the electrolysis of brine, it is essential to prevent the mixing of the products because

- A. sodium and chlorine readily combine
- B. chlorine gives a green coloration
- C. chlorine readily recombines with sodium hydroxide
- D. sodium hydroxide forms a carbonate in the presence of air and chlorine

9. In what way is equilibrium constant for the forward

reaction related to that of the reverse reaction?

- A. The two equilibrium constants are identical
- B. The product of the two is always greater than one
- C. The product of the two is expected to be one
- D. The addition of the two is expected to be one

10. When chlorine water is exposed to sunlight, the gas evolved is

- A. Cl_2
- B. O_2
- C. HCl
- D. CO_2

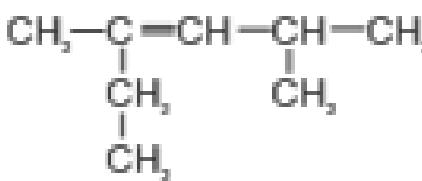
11. PbCl_2 does not dissolve in liquid ammonia while AgCl does. This is because

- A. Pb is not a transition metal while Ag is
- B. Ag is not a transition metal while Pb is
- C. AgCl turns grey on exposure to light
- D. AgCl dissolves in hot water

12. When sodium hydroxide pellets are exposed to the atmosphere, the first gas they absorb is

- A. CO_2
- B. Water vapour
- C. Oxygen
- D. Nitrogen

13. What is the IUPAC name of the hydrocarbon?



- A. 2-ethyl-4-methyl pent-2-ene
- B. 3,5 dimethyl hex-3-ene
- C. 2,4-dimethyl hex-3-ene
- D. 3-methyl 2-ethyl hex-2-ene

14. Which of the following is NOT a monomer?

- A. 
- B. $\text{CH}_2=\text{CH}_2$
- C. $\text{CH}_2=\text{CHCl}$
- D. 

15. Which of the following behaves like ethyne?

- A. $\text{CH}_2\text{CH}=\text{CHCH}_3$
- B. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}=\text{CH}_2$
- C. $\text{CH}_2=\text{CH}_2$
- D. CH_3CH_3

SUCCESS QUOTE

"Academic Success is directly proportional to hard work, provided that Prayers remain constant."

~Henry Divine

CHEMISTRY 2005/2006 ANSWERS

1. A mixture is a material system made up by two or more different substances which are mixed together but are not combined chemically. It is the physical combination of two or more substances the identities of which are retained and are mixed in the form of alloys, solutions, suspensions and colloids.

Sodium chloride is a compound chemically produced. Sea water is a mixture of sand, water and salts. Iron filings is an element existing alone. Granulated sugar is a simple compound.

Ans. B

2. Recall that the valency of an element is the combining power of the element. An element X with atomic number 8 is a non-metal with a valency of -2 while an element Y with atomic number 13 is a metal with a valency of +3. When X and Y combine, their valencies are interchanged to form the compound: Y_2X_3 .

Ans. A



$$100\text{ g of CaCO}_3 = 44\text{ g of CO}_2$$

$$1\text{ g of CaCO}_3 = 0.44\text{ g of CO}_2$$

Therefore, 1g of CaCO_3 is in the mixture.

$$\text{Percentage of CaO} = \frac{3 - 1}{3} \times 100\% = 66.67\%$$

Ans. C

4. Recall that alkanoic acids form a homologous series with the general molecular formula of $\text{C}_n\text{H}_{2n+1}\text{COOH}$. From the general formula, we have that

$$(12 \times n) + [1 \times (2n+1)] + 12 + 16 + 16 + 1 = 88$$

$$12n + 2n + 1 + 45 = 88$$

$$14n + 46 = 88$$

$$14n = 88 - 46 = 42$$

$$n = \frac{42}{14} = 3$$

14

We therefore obtain the molecular formula by substituting for n in the general formula, i.e. $\text{C}_3\text{H}_7\text{COOH}$

Ans. D

5. $\frac{R_m}{R_{m1}} = \sqrt{\frac{D_m}{D_{m1}}} \rightarrow \frac{1}{R_{m1}} = \sqrt{\frac{16}{32}}$

$$\therefore R_{m1} = \sqrt{\frac{32}{16}} = 1.41 \quad \text{Ans. C}$$

6. According to the kinetic theory of gases, the gas molecules move randomly in straight lines, colliding with one another and with the walls of the container. These collisions constitute the gas pressure. An increase in temperature leads to an increase in the kinetic energy of the gas particles, an increase in the frequency (or number) of collisions and an increase pressure.

Ans. D

7. The anode is the positive electrode which is connected to the positive terminal of the electric source. It is the electrode through which electrons leave the electrolyte. Loss of electron is oxidation.

Ans. C

8. Note that brine is the name given to conc. sodium chloride solution. The industrial process for the electrolysis of brine is referred to as the *chloroalkali process*. Depending on the method used, several products besides *hydrogen* can be produced. If the products are prevented from mixing, *chlorine* and *sodium hydroxide* are the products. If mixing of products is allowed, the sodium hydroxide produced attacks liberate carbon(IV) oxide to form carbonate.
$$2\text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$$

Ans. D

9. Equilibrium constant is defined as the ratio of the rate of forward reaction to that of backward reaction. In writing equilibrium constant for forward reactions, the products are placed as the numerator while the reactants are placed as the denominator. In writing reverse or backward equilibrium constant, reactants form the numerator while products form the denominator. Consider the "reaction" below:



If

Forward equilibrium constant = K_e

Reverse equilibrium constant = K_{e1}

Then,

$$K_e = \frac{[\text{Products}]^y}{[\text{Reactants}]^x} \quad K_{e1} = \frac{[\text{Reactants}]^x}{[\text{Products}]^y}$$

This shows that the equilibrium constant of the forward reaction is the inverse (or opposite) of that of the reverse reaction. That is, $K_e = \frac{1}{K_{e1}}$
$$\rightarrow K_e \times K_{e1} = 1$$

Therefore, the product of the two is expected to

be one.

Ans. C

10. Note that chlorine water is the name given to a solution of chlorine. Under the action of light, chlorine water gives oxygen and hydrochloric acid. $\text{HOCl} \rightarrow \text{HCl} + \frac{1}{2}\text{O}_2$

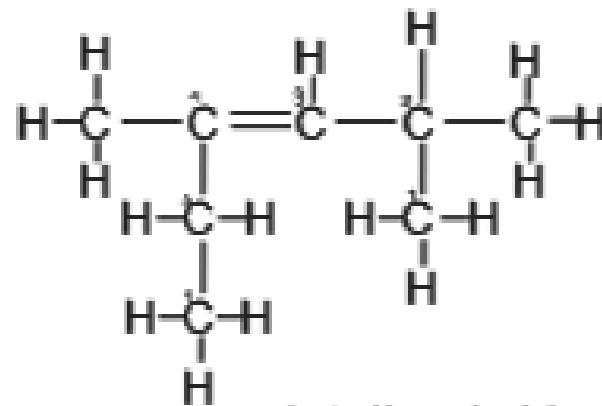
Ans. B

11. Ans. A

12. Sodium hydroxide is a white, crystalline solid. It is deliquescent and melts at about 320°C without decomposing. It readily absorbs carbon(IV) oxide (a weak acidic oxide) to form sodium trioxocarbonate(IV).

Ans. A

13.



2,4-dimethyl hex-3-ene

Ans. C

14. A monomer is the simplest non-redundant unit from which a polymer is synthesized. To be a monomer, a molecule must be unsaturated (i.e. alkenes, alkynes or their derivatives) or possess at least two functional groups that can condense. Examples of monomers include ethene ($\text{CH}_2=\text{CH}_2$), chloroethene ($\text{CH}_2=\text{CHCl}$), phenylethene ($\text{C}_6\text{H}_5\text{CH}_2=\text{CH}_2$). Benzene is the polymerization product of ethene.

Ans. A

15. Given their structure, the properties of ethyne are similar to those of ethene. For example, both give addition reactions.

Ans. C

SUMMARY OF ANSWERS [CHEMISTRY 2005/2006]

1.B	2.A	3.C	4.D	5.C
6.D	7.C	8.D	9.C	10.B
11.A	12.A	13.C	14.A	15.C

SUCCESS QUOTE

"The future belongs to those who believe in the beauty of their dreams."

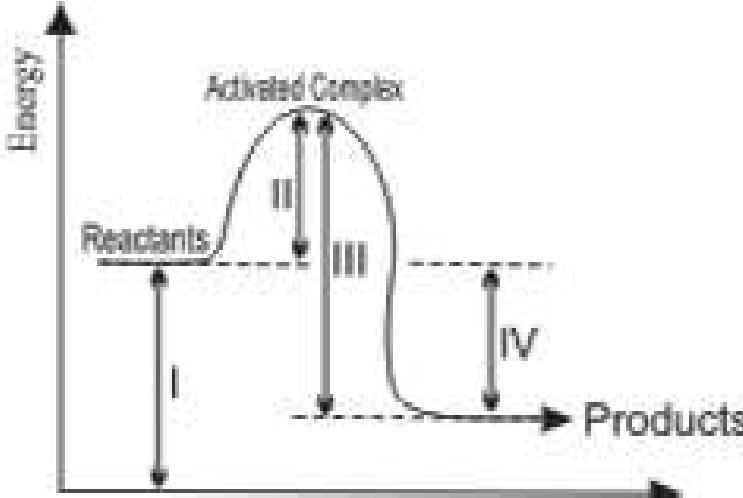
~ *Franklin Roosevelt* ~

CHEMISTRY 2006/2007 QUESTIONS

Indicate the correct option in each of the following questions

1. A mixture of iron and sulphur can be separated by dissolving the mixture in
- Steam
 - Dilute hydrochloric acid
 - Dilute sodium hydroxide
 - Benzene
2. If 67.5g of oxide of lead was reduced to 61.2g of metal, calculate the formula of the oxide. (Pb = 207, O = 16)
- PbO
 - PbO₂
 - Pb₂O₄
 - Pb₃O₄
3. Calculate the minimum volume of the oxygen that is required for complete combustion of a mixture of 20cm³ of CO and 10cm³ of hydrogen.
- 5 cm³
 - 10 cm³
 - 15 cm³
 - 20 cm³
4. $\text{HNO}_3 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{NO}_2^-$
In the reaction above, NO₂⁻ is the
- Conjugate acid
 - Acid
 - Conjugate base
 - Base
5. The pH range of a neutralization product of CH₃COOH and KOH is
- 1 - 3
 - 7 - 8
 - 6 - 7
 - 12 - 14
6. How much NaOH is required to make 250cm³ of 0.1 mol/dm³ solution?
- 10g
 - 1.0g
 - 0.1g
 - 4g
7. $2\text{PbO}_2 \rightarrow 2\text{PbO} + \text{O}_2$
In the equation above, the oxidizing agent is
- Pb²⁺
 - Pb²⁻
 - O²⁻
 - O₂
8. A current of 0.5 A flows for 1930 seconds and deposits 0.325 g of metal M. If the charge is +2, the relative molecular mass is
- 65 g
 - 32 g
 - 24 g
 - 40 g
9. Emission of chlorofluorocarbon (CFC) into the atmosphere causes
- global warming
 - acid rain
 - depletion of ozone layer
 - greenhouse effect

10.



The diagram above shows the reaction path of an exothermic reaction. The heat of reaction is represented by

- A. I B. II C. III D. IV

11. Which of the following samples will react fastest with dilute HCl?

- A. 10g of lumps of CaCO₃ at 25°C
B. 10g of powdered CaCO₃ at 25°C
C. 10g of lumps of CaCO₃ at 50°C
D. 10g of powdered CaCO₃ at 50°C

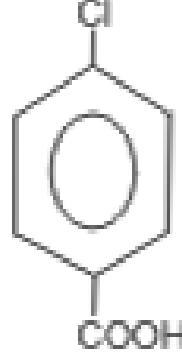
12. The colour exhibited by copper in a flame test is

- A. green B. lilac
C. blue-green D. crimson

13. Which of the following statements is correct?

- A. Chlorine bleaches by oxidation while sulphur(IV) oxide bleaches by reduction
B. Chlorine bleaches by reduction while sulphur(IV) oxide bleaches by oxidation
C. Both of them bleach by oxidation
D. Both of them bleach by reduction

14. The IUPAC name for



is

- A. 1-chlorobenzoic acid
B. 3-chlorobenzoic acid
C. M-chlorobenzoic acid
D. P-chlorobenzoic acid

15. 3-methylbutan-2-one is an isomer of

- A. Pentanal B. 3-methylpentan-2-one
C. Hex-3-ene D. 2-methylprop-1-ene

CHEMISTRY 2006/2007 ANSWERS

1. Note that every mixture contains two or more different substances. Each constituent of a mixture still retains its individual properties. Any technique employed in separating a mixture must make use of the *physical properties* of its constituents (not their chemical properties). This implies that mixtures are separated by physical means. Iron or sulphur would react with steam, dil. HCl and dil. NaOH but both have no reaction with benzene. The solvents for sulphur are carbon(IV) sulphide, methyl benzene and benzene.

Ans. D

2. Mass of oxide of lead = 67.5 g

Mass of metal = 61.2 g

Mass of oxygen = $67.5 - 61.2 = 6.3$ g

Element	Pb	:	O
Relative mass	61.2g		6.3g

$\frac{\text{Atom mass}}{\text{Molar mass}}$	$\frac{61.2}{207}$	= 0.3	$\frac{6.3}{16}$
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Molar ratio	1		1.33
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Smallest molar ratio (i.e. 0.3)	3		4
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Multiplying through by 3 Therefore, the formula of the oxide is Pb₂O₃.

Ans. C

3. $2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$

2	:	1	:	2
---	---	---	---	---

20cm ³	:	10cm ³	:	20cm ³
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10cm³ of O₂ is needed.

$2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

2	:	1	:	2
---	---	---	---	---

10cm ³	:	5cm ³	:	10cm ³
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5cm³ of O₂ is needed.

Total O₂ needed = $10\text{cm}^3 + 5\text{cm}^3 = 15\text{cm}^3$

Ans. C

4. Considering the reverse reaction, we notice that NO₃⁻ can gain a proton from H₃O⁺. Hence, it is the conjugate base.

Ans. C

5. Note that the two neutralization products of CH₃COOH and KOH are CH₃COOK and H₂O i.e. salt and water.

CH₃COOH + KOH → CH₃COOK + H₂O

CH₃COOK is a salt of weak acid and strong base.

The salt will be basic when dissolved in water

because the strengths of acid and base are not equal. Therefore, CH_3COOK when dissolved in water will have all the properties of KOH (a base).

Ans. D

6. $\text{g}/\text{dm}^3 = \text{mol}/\text{dm}^3 \times \text{molar mass}$

$$\begin{aligned}\text{g}/\text{dm}^3 &= \text{mass conc.} = 0.1 \text{ mol}/\text{dm}^3 \times 40 \text{ g/mol} \\ &= 4 \text{ g}/\text{dm}^3\end{aligned}$$

Recall that $1 \text{ dm}^3 = 1000 \text{ cm}^3$.

This implies that,

4 g of NaOH is needed for 1000 cm^3

X g of NaOH is needed for 250 cm^3

$$\rightarrow X = \frac{4 \text{ g} \times 250 \text{ cm}^3}{1000 \text{ cm}^3} = 1 \text{ g}$$

Ans. B

7. Considering redox in terms of Oxygen, we note that a species is said to have been reduced if it loses oxygen from left to right of an equation. This reduced species is also the oxidizing agent. In another way, the oxidizing agent is usually defined as the oxygen donor while the oxygen acceptor is the reducing agent. So the oxidized species is the one that gains oxygen from left to right of an equation.

In the given equation, the reduced species is Pb^{+2} (i.e. from Pb^{4+} to Pb^{+2}); hence, it is the oxidizing agent.

Ans. A

8. $i = 0.5A$, $t = 1930s$, $m = 0.325\text{g}$, valency = +2

1 mole = 1 Farad \times valency

where 1 Farad = 96500 C

1 mole of metal = $96500 \times 2 = 193,000 \text{ C}$

But 0.325 g of metal = it

$$= 0.5 \times 1930 = 965 \text{ C}$$

i.e. 0.325 g of metal = 965 C

$$x = 193,000 \text{ C}$$

$$x = \frac{0.325 \times 193,000}{965}$$

$$x = 65 \text{ g}$$

Ans. A



Ans. C

10. Heat of reaction is the amount of heat evolved or absorbed when a chemical reaction occurs between molar quantities of the substances as represented in the equation of reaction under standard conditions.

Ans. D

11. At high temperatures, rate of reaction is high and powdered reactants provide greater surface area for reactions.

Ans. D

12. All copper(II) salts impart a characteristic bluish-green colour to a non-luminous flame.

Ans. C

13. A bleaching agent is a substance that can whiten or decolorize other substances. They act by essentially destroying, either by oxidation or reduction, the *chromophores* which are a group of atoms responsible for the different colours of coloured substances. The oxidizing bleaching agents are chlorine, chlorine dioxide, alkaline hypochlorites, sunlight, etc. Reducing agents used in bleaches include sulfites, bisulfites, and sodium borohydride.

Ans. A

14. Ans. A

15. 3-methylbutan-2-one is isomeric with Pentanal since both have the molecular formula $\text{C}_5\text{H}_{10}\text{O}$ but different arrangement of atoms and bonds.

Ans. A

SUMMARY OF ANSWERS

[CHEMISTRY 2006/2007]

1.D	2.C	3.C	4.C	5.D
6.B	7.A	8.A	9.C	10.D
11.D	12.C	13.A	14.A	15.A

SUCCESS QUOTE

"A few months from now, you will either bear the consequences of your misplaced priorities, laziness and self-indulgence or look back and be grateful that your sacrifices, determination and hard work have paid off after all."

~ Henry Divine

CHEMISTRY 2007/2008 QUESTIONS

1. Two immiscible liquids with different boiling points can be separated by
A. the use of separating funnel
B. evaporation
C. distillation
D. decantation
2. A mixture of CaCl_2 and CaCO_3 in water can be separated by
A. evaporation B. sublimation
C. distillation D. decantation
3. Consider the reaction represented by
 $x\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + y\text{NO}_2 + z\text{O}_2$
What are the values of x, y and z respectively?
A. 2, 6, 3 B. 1, 4, 2
C. 2, 4, 1 D. 2, 4, 2
4. 20 cm³ of H₂ mixed and separated with 100 cm³ of air containing 21% O₂. Calculate the volume of the residual gases at 110 °C.
A. 31 cm³ B. 11 cm³
C. 90 cm³ D. 110 cm³
5. What is responsible for metallic bonding?
A. Sharing of electrons between the metal atoms
B. Attraction between the atomic nuclei and the cloud of electrons
C. Transfer of electrons from one atom to another
D. Attraction between positive and negative ions
6. 25 cm³ of 1.5 M solution of NaCl are added to 50 cm³ of 3 M NaCl. The molar concentration of the resulting solution is
A. 2.5 M B. 3 M
C. 2.25 M D. 4.5 M
7. A solution of salt formed from HCl and NH₃ solutions is
A. acidic B. basic
C. complex D. neutral
8. Which of the following elements will burn in excess oxygen to form a product that is neutral to litmus?
A. Carbon B. Hydrogen
C. Sulphur D. Sodium
9. A current was passed for 10 mins and 0.2 mole of Cu was deposited. How many grammes of Ag will

- it deposit?
(Cu = 64, Ag = 108)
- A. 43.2 g B. 21.6 g
C. 10.8 g D. 5.4 g
10. Pollution of underground water by metal ions is very likely in a soil that has high
A. acidity B. alkalinity
C. chloride content D. nitrate content
 11. Producer gas is a gas with low calorific value because it contains more
A. CO₂ than O₂ B. N₂ than CO
C. CO₂ than N₂ D. N₂ than CO₂
 12. For most reversible reactions,
A. the reaction rate increase with time
B. the reaction rate decreases with time
C. the rate stabilizes with time
D. the rate produces a curve with time
 13. Which of the following compounds will leave a metal residue when heated?
A. Cu(NO₃)₂ B. AgNO₃,
C. K₂CO₃ D. Na₂CO₃
 14. Which of the polymers contains nitrogen?
A. Nylon B. PVC
C. Polyethene D. Cellulose
 15. A red precipitate of copper(I) dicarbide is formed when ammonium solution of copper(I) chloride is introduced into
A. CH₂=CH-CH₂-CH₃
B. CH₃-CH₂-C≡CH
C. CH₃-CH₂-CH₂-CH₃
D. CH₃-C≡C-CH₃

SUCCESS QUOTE

Keep away from people who try to belittle your ambitions. Small people always do that, but those who are really great make you feel that you too can become great."

~ Mark Twain

hexane-1,6-diamine, $\text{H}_2\text{N}-(\text{CH}_2)_5-\text{NH}_2$, and hexanedioic acid, $\text{COOH}-(\text{CH}_2)_4-\text{COOH}$.

In general, the molecules of nylons contain the recurring amide group CONH.

Ans. A

15. Ans. D

SUMMARY OF ANSWERS (CHEMISTRY 2007/2008)

1.A	2.D	3.C	4.D	5.B
6.A	7.A	8.B	9.A	10.D
11.B	12.C	13.B	14.A	15.D

FEATURES OF THIS BOOK

- Quick Subject Revision Aids
- Admission Success Secrets
- Bonus Tips
- Success Quotes
- Answers to Frequently Asked Questions (FAQ's)

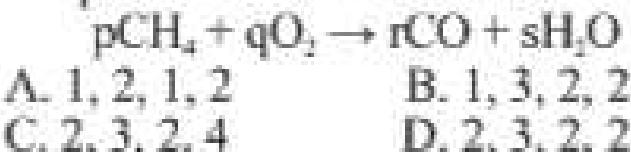
In the *Quick Subject Revision Aids*, efforts were made to highlight the basic concepts of the subjects and to provide insights into the likely examination questions. The *Admission Success Secrets* are geared towards solving the problem of lack of admission orientation among candidates and providing answers to their *Frequently Asked Questions*.

The *Bonus Tips* provide you with those extra information you need to have an edge over others. *Success Quotes* were also included to get you motivated, because if you are motivated, then you are already half-way to your success.

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CHEMISTRY 2008/2009 QUESTIONS

1. What are the values of p, q, r and s respectively in the equation?



2. KHCO_3 is contaminated with K_2CO_3 as impurity. If 2.5 g of the impure KHCO_3 on heating produces 0.224 dm³ of CO_2 at s.t.p., calculate the percentage of K_2CO_3 impurity.
(K = 39, H = 1, C = 12, O = 16)
A. 30% B. 40%
C. 10% D. 20%

3. The partial pressure of N_2 in a container at 50°C in which there are 0.30 mole of N_2 and 1.2 mole of CO_2 at a pressure of 2.00 atm is?

- A. 0.6 atm B. 0.5 atm
C. 0.4 atm D. 1.6 atm

4. The major reason why chemical reaction occurs among elements is that they have the tendency to
A. attain the nearest noble gas structure
B. become a metal
C. become a non-metal
D. become a noble element

5. Given that the pH of a solution of KOH is 12, what is the concentration of the OH^- ions?

- A. 0.01 mol/dm³ B. 1×10^{-12} mol/dm³
C. 1×10^{-14} mol/dm³ D. 1×10^2 mol/dm³

6. Which of the following salt has a pH less than 7?
A. NaHCO_3 B. NH_4Cl
C. Na_2SO_4 D. NaCl

7. In which of the following reactions does hydrogen peroxide act as a reducing agent?

- A. $\text{PbO}_2 + 2\text{HNO}_3 + \text{H}_2\text{O}_2 \rightarrow \text{Pb}(\text{NO}_3)_2 + 2\text{H}_2\text{O} + \text{O}_2$
B. $\text{H}_2\text{S} + \text{H}_2\text{O}_2 \rightarrow \text{S} + 2\text{H}_2\text{O}$
C. $\text{PbSO}_4 + \text{H}_2\text{O}_2 \rightarrow \text{PbSO}_4 + \text{H}_2\text{O}$
D. $2\text{I}^- + 2\text{H}^+ + \text{H}_2\text{O}_2 \rightarrow \text{I}_2 + 2\text{H}_2\text{O}$

8. Temporary hardness of water is removed by the use of the following EXCEPT

- A. Boiling B. Use of $\text{Ca}(\text{OH})_2$
C. Use of Na_2CO_3 D. Use of alum

9. Hydration of ions in solution is associated with

- A. Liberation of heat B. Absorption of heat
C. Reduction of heat D. Conduction of heat

10. A piece of radioactive element has initially 8.0×10^{22} atoms. Half life is two days. After 16 days, the number of atoms is
- A. 5×10^{21} B. 5×10^{22}
C. 2×10^{22} D. 2×10^{21}
11. Which of the following pairs of substances are hygroscopic?
- A. CaCl and NaOH
B. CaO and KOH
C. Conc. H_2SO_4 and MgCl₂
D. CuO and CaO
12. Zinc is not regarded as a transition metal even though it is a d-block element because
- A. It has no electron in 3d-orbitals
B. It has all 3d-orbitals completely filled
C. It blends with other neighboring elements
D. It does not form complex ions like others
13. Silver chloride turns grey when exposed to sunlight because
- A. The silver ion is reduced to silver
B. The silver ion is oxidized to silver
C. Silver is a transition metal
D. The silver chloride forms complexes in the sun
14. Which of these compounds exhibits resonance?
- A. Benzene B. Ethanol
C. Propene D. Butyne
15. Hydrolysis of $CH_3COOCH_2CH_3$ in dilute HCl produces
- A. $CH_3COOH + CH_3CH_2$
B. $CH_3CH_2OH + CH_3COCl$
C. $CH_3COOH + CH_3CH_2OH$
D. $CH_3COOH + CH_3CH_2Cl$

SUCCESS QUOTE

"...the moment you stop doing the very things that got you to the top of the mountain is the very moment you begin the slide down to the valley."

~Robin Sharma

CHEMISTRY 2008/2009 ANSWERS



Therefore, p = 1, q = 2, r = 1, s = 2

Ans. A



2moles of KHCO₃ = 1mole of CO₂

$2[39+1+12+(16\times 3)]g$ of KHCO₃ = 1mole of CO₂

200g of KHCO₃ = 1mole of CO₂

But 1mole of CO₂ occupies 22.4dm³ at s.t.p.

\rightarrow 200g of KHCO₃ = 22.4dm³ of CO₂

OR

22.4dm³ of CO₂ = 200g of KHCO₃

$0.224dm^3$ of CO₂ = $\frac{200}{22.4} \times 0.224g$ of KHCO₃

22.4

0.224dm³ of CO₂ = 2g of KHCO₃

% of K₂CO₃ impurity = $\frac{2.5 - 2}{2.5} \times 100\%$

2.5

= 20% Ans. D

3. The law of partial pressure states that if there is a mixture of gases which do not react chemically together, then the total pressure exerted by the mixture is the sum of the partial pressures of the individual gases that make up the mixture. Mathematically, this can be expressed as:

$$P_T = P_A + P_B + P_C + \dots$$

Where P_T = total pressure of the mixture, and P_A, P_B, P_C, are the partial pressures exerted separately by the individual gases A, B, C that make up the mixture.

Let P_A, P_B, be the partial pressures exerted separately by CO₂ and N₂; and P_T the total pressure of the mixture.

No of moles of CO₂ (n_A) = 1.2moles

No of moles of N₂ (n_B) = 0.3 mole

Total No of moles(n_T) = 1.2 + 0.3 = 1.5moles

$$P_A = \left(\frac{n_A}{n_T}\right)P_T$$

$$2 = \left(\frac{1.2}{1.5}\right)P_T = 0.8P_T$$

$$P_T = \frac{2}{0.8} = 2.5 \text{ atm}$$

$$\text{Therefore, } P_B = \left(\frac{n_B}{n_T}\right)P_T = \left(\frac{0.3}{1.5}\right) \times 2.5 = 0.5 \text{ atm}$$

Ans. B

4. Ans. A

5. PH = 12, [OH] = ?

$$PH + POH = 14$$

$$12 + POH = 14$$

$$POH = 14 - 12 = 2$$

$$POH = 2$$

$$\text{But } POH = -\log_{10}[\text{OH}]$$

Applying the law of indices, we have

$$10^{POH} = 1/[\text{OH}]$$

$$\rightarrow 10^{POH} = [\text{OH}]$$

$$[\text{OH}] = 10^{-2} = 0.01 \text{ mol/dm}^3$$

Ans. A

6. NaHCO_3 is an acidic salt. An acidic salt has an ionizable hydrogen and has all the properties of an acid.

Ans. A

7. Reducing agent (hydrogen peroxide) reduced the ion Pb^{4+} in PbO_2 to Pb^{2+} in $\text{Pb}(\text{NO}_3)_2$.

Ans. A

8. Water that contains calcium and magnesium ions is called hard water. When these ions are accompanied by hydrogen carbonate ions, the water is said to contain temporary hardness. It is called temporary because the calcium and magnesium ions can be removed from the water by boiling.

Temporary hardness can also be removed by using slaked lime, $\text{Ca}(\text{OH})_2$, or by the use of washing soda, Na_2CO_3 .

Ans. D

9. The hydration energy is the heat change that takes place when one mole of a gaseous ion dissolves in water to give an infinitely dilute solution.
Hydration of ions in solution is associated with the liberation of a large amount of heat.

Ans. A

10. $N_0 = 8.0 \times 10^{22}$

$T_s = 2 \text{ days}, t = 16 \text{ days}, N = ?$

$$\frac{N}{N_0} = \left(\frac{t}{T_s}\right)^2$$

$$\frac{N}{8.0 \times 10^{22}} = \left(\frac{16}{2}\right)^2$$

$$N = \left(\frac{16}{2}\right)^2 \times 8.0 \times 10^{22}$$

$$N = 3.125 \times 10^{24} \text{ atoms}$$

11. Hygroscopic substances are those substances which when exposed to the atmosphere absorb moisture but will not turn into solution.

Concentrated sulphuric acid, potassium hydroxide, sodium hydroxide, zinc chloride and calcium chloride (and many different salts) are rather deliquescent, that is, they absorb moisture and turn into solution.

Ans. D

12. The atomic number of zinc is 30. Its electronic configuration is $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$. It has a completely filled 3d orbitals.

Ans. B

13. Ultraviolet radiation decomposes the silver halide, producing minute grains of metallic silver. The reality is almost certainly more complicated than this and involves the formation of complexes using the halide ions and the grains of silver and silver halide. The white silver chloride precipitate takes on a purplish colour when first exposed to light. This darkens and becomes more grey in colour. Ans. D

14. One of the postulates of resonance theory is that when a molecule or ion can be represented by two or more contributing structures, then it is not adequately represented by any single contributing structure. We can represent benzene as a hybrid of two equivalent contributing structures, often referred to as Kekulé structures. Each Kekulé structure makes an equal contribution to the hybrid, and thus the C-C bonds are neither single nor double bonds but something intermediate.

Ans. A

15. Ethyl ethanoate can be hydrolyzed by water into its component acid and alkanol again. In practice, this reaction is extremely slow, even on boiling, but it is catalyzed by hydrogen or hydroxide ions i.e. a dilute acid or alkali.

Ans. C

SUMMARY OF ANSWERS [CHEMISTRY 2008/2009]

1.A	2.D	3.B	4.A	5.A
6.A	7.A	8.D	9.A	10..
11.D	12.B	13.D	14.A	15.C

SUCCESS QUOTE

“Self-discipline is the bridge between goals and accomplishments.”

~ Jim Rohn

CHEMISTRY 2009/2010 QUESTIONS

1. The presence of NaCl in ice will
A. lower the boiling point of NaCl
B. increase the melting point of NaCl
C. make NaCl impure
D. lower the melting point of ice

2. What are the values of x, y and z in the equation below?
$$x\text{NH}_3 + y\text{O}_2 \rightarrow z\text{NO} + 6\text{H}_2\text{O}$$

A. 2, 3, 4 B. 4, 5, 4
C. 6, 5, 4 D. 2, 3, 4

3. Calculate the volume of CO₂ measured at s.t.p produced on heating 250g of potassium hydrogen trioxocarbonate(IV) strongly. (K = 39, H = 1, C = 12, O = 16)
A. 28 dm³ B. 2.8 dm³
C. 5.6 dm³ D. 11.2 dm³

4. The boiling points of water, ethanol, methylbenzene and butan-2-ol are 373.0K, 351.3K, 383.6K and 372.5K respectively. Which liquid has the highest vapour pressure at 323.0K?
A. Water B. Methylbenzene
C. Ethanol D. Butan-2-ol

5. The conclusion from Rutherford's alpha-scattering experiment is that
A. Atoms are mostly empty space with a small nucleus
B. Emissions from radioactive substances consist of three main components
C. There is a nuclear pull on orbital electrons
D. Electrons are deflected by both magnetic and electric fields

6. Elements P, Q and R have atomic numbers 9, 16 and 20 respectively. Which of them would gain electron(s) during ionic bonding?
A. Q and R B. P and R
C. P and Q D. P, Q and R

7. Which of the following has the lowest pH?
A. 5cm³ of M/10 HCl
B. 10cm³ of M/10 HCl
C. 20cm³ of M/8 HCl
D. 15cm³ of M/2 HCl

8. Which of the following is an acid salt?
A. (NH₄)₂CO₃ B. CHCOONa
C. KHSO₄ D. MgSO₄.7H₂O

9. CrO₄²⁻ + 14H⁺ + 6I⁻ → 2Cr³⁺ + 3I₂ + 7H₂O
The change in the oxidation number of oxygen in the equation above is
A. 0 B. 1
C. 2 D. 7

10. During the electrolysis of CuSO₄ solution using Platinum electrodes, which of the following occurs?
A. Acidity increases at the cathode
B. Oxygen is liberated at the cathode
C. pH decreases at the cathode
D. pH of solution decreases

11. Which of the following ions is a pollution in drinking water even in trace quantities?
A. Ca²⁺ B. Pb²⁺
C. Mg²⁺ D. Fe²⁺

12. The solubility of a salt of molar mass 100g at 20°C is 0.34mol/dm³. If 3.4g of that salt dissolved completely in 250cm³ of water at that temperature, the resulting solution is
A. A suspension B. Saturated
C. Unsaturated D. Supersaturated

13. Catalyst is important in chemical industry in that
A. It affects the purity of the products
B. It affects the quantity of the products
C. It increases the time for reaching equilibrium
D. Bond breaking is slowed down

14. An alkanoic acid has a molecular mass of 88. Name the acid. (C = 12, O = 16, H = 1)
A. Propanoic acid B. Butanoic acid
C. Pentanoic acid D. But-2-ionic acid

15. Ethyne undergoes the following reactions except
A. Polymerization B. Addition
C. Substitution D. Etherification

SUCCESS QUOTE

"Nobody is saying that the road to the Den would be easy. But know this: the Lord who brought you this far will not abandon you."

~ Henry Divine

CHEMISTRY 2009/2010 ANSWERS

1. The melting point of a pure substance is always higher and has a smaller range than the melting point of an impure substance. The more the impurity present, lower the melting point and the broader the range.
The presence of NaCl in ice will lower the melting point of ice. **Ans. D**



3. $2\text{KHCO}_3 \rightarrow \text{K}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O}$
2moles of KHCO₃ = 1mole of CO₂,
 $2[39+1+12+(16\times 3)]\text{g}$ of KHCO₃ = 1mole of CO₂,
200g of KHCO₃ = 1 mole of CO₂,
But 1mole of CO₂ occupies 22.4dm³ at s.t.p.
→ 200g of KHCO₃ = 22.4dm³ of CO₂,
 $\frac{250}{200} \times 22.4 = 28\text{dm}^3$ of CO₂. **Ans. A**

4. There is an inverse relationship between boiling point and vapour pressure. Thus, the high vapour pressure liquid will require a lower boiling point because its molecules already have high kinetic energy. If the vapour pressure gets lower, then it requires more energy to get these lethargic molecules into the atmosphere. So if you want to boil them away, the boiling point is usually higher. There is more inertia (ability to resist change) in a liquid with lower vapour pressure. **Ans. C**

5. **Ans. A**

6. $\text{P} = 1s^2 2s^2 2p^3$
 $\text{Q} = 1s^2 2s^2 2p^6 3s^1 3p^4$
 $\text{R} = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
P belongs to period 2 and group 7 of the periodic table (non-metal). Q belongs to period 3 and group 6 of the periodic table (non-metal). R belongs to period 4 and group 2 of the periodic table (metal). Non-metals gain electron(s) during ionic bonding while metals donate their electron(s). Therefore, P and Q would gain electron(s). **Ans. C**

7. $n = CV, \text{pH} = -\log_{10}[\text{H}^+]$

For A,

$$n = \frac{5 \text{ dm}^3}{1000} \times \frac{1 \text{ mole}}{10 \text{ dm}^3} = 5 \times 10^{-3} \text{ moles}$$

$$\text{pH} = -[\log_{10} 5 \times \log_{10} 10^{-3}] = 3.3$$

For B,

$$n = \frac{10 \text{ dm}^3}{1000} \times \frac{1 \text{ mole}}{10 \text{ dm}^3} = 1 \times 10^{-3} \text{ moles}$$

$$\text{pH} = -[\log_{10} 1 \times \log_{10} 10^{-3}] = -[0 + (-3)] = 3$$

For C,

$$n = \frac{20 \text{ dm}^3}{1000} \times \frac{1 \text{ mole}}{8 \text{ dm}^3} = 2.5 \times 10^{-3} \text{ moles}$$

$$\text{pH} = -[\log_{10} 2.5 \times \log_{10} 10^{-3}] = 2.6$$

For D,

$$n = \frac{15 \text{ dm}^3}{1000} \times \frac{1 \text{ mole}}{2 \text{ dm}^3} = 7.5 \times 10^{-3} \text{ moles}$$

$$\text{pH} = -[\log_{10} 7.5 \times \log_{10} 10^{-3}] = 2.1$$

From the above, we see that D has the lowest pH. **Ans. D**

8. An acid salt contains ionizable hydrogen. It has all the properties of an acid. It neutralizes alkali to form salt and water.



Ans. C

9. We calculate the oxidation number of oxygen on the left hand side (LHS)



$$2(+6) + 7\text{O} = -2$$

$$+12 + 7\text{O} = -2$$

$$7\text{O} = -2 - 12 = -14$$

$$\text{O} = -14/7 = -2$$

Next, we calculate the oxidation number of oxygen on the right hand side (RHS)



$$2(+1) + \text{O} = 0$$

$$+2 + \text{O} = 0$$

$$\text{O} = -2$$

Since LHS = RHS, change in oxidation number of oxygen in the equation is zero. **Ans. A**

10. The electrolysis of aq. CuSO₄ using platinum electrodes, yields copper deposits at the cathode and oxygen at the anode.

The solution becomes acidic as a result of the

gradual discharge of Cu^{2+} and OH^- , leaving H^+ and SO_4^{2-} in the solution. **Ans. D**

11. No matter how small lead is present in water, it causes lead poisoning. **Ans. B**

12. Molar mass of salt = $100\text{g/mol} = \text{MM}$
 $\text{Solubility in g/dm}^3 = \text{Solubility in mol/dm}^3 \times \text{MM}$
Mass of the salt = $0.3 \frac{\text{mol}}{\text{dm}^3} \times \frac{100\text{g}}{\text{mol}}$
= 30g/dm^3

30g of the salt saturates 1000cm^3

What mass will saturate 250cm^3 ?

That is, $\frac{30\text{g}}{1000\text{cm}^3} \times 250\text{cm}^3 = 7.5\text{g}$ of salt

7.5g of the salt is supposed to saturate 250cm^3 of solution but 3.4g of salt were dissolved in it.
Therefore, the solution is unsaturated.

Ans. C

13. **Ans. C**

14. $\text{C}_{n+1}\text{H}_{2n+1}\text{COOH} = 88$

$$(12 \times n) + [1 \times (2n+1)] + 12 + 16 + 16 + 1 = 88$$

$$12n + 2n + 1 + 45 = 88$$

$$14n + 46 = 88$$

$$14n = 88 - 46 = 42$$

$$n = \frac{42}{14} = 3$$

$$14$$



Therefore, the name of the acid is butanoic acid. **Ans. B**

Compare with Question No 4 of Year 2005/06.

15. **Ans. D**

SUMMARY OF ANSWERS [CHEMISTRY 2009/2010]

1.D	2.B	3.A	4.C	5.A
6.C	7.D	8.C	9.A	10.D
11.B	12.C	13.C	14.B	15.D

SUCCESS QUOTE

"The same excuses that many give for their failure are the same excuses that propel others to great heights. What a paradox!"

~ Arnold H Huxley

CHEMISTRY 2010/2011 QUESTIONS

1. Crystallization is a better method of separation than precipitation because
- precipitation tends to bring other solutes out of solution
 - crystallization is applicable to all solids
 - precipitation always involves salting-out
 - crystallization can only be done at high temperatures
2. Which of the following is not a chemical change?
- burning of magnesium
 - rusting of iron
 - action of water on potassium
 - dissolving powdered sulfur in carbon disulfide
3. An important ore of iron contains 72.36% iron and 27.64% oxygen. Determine its empirical formula
- FeO
 - Fe_2O_3
 - Fe_3O_4
 - Fe_2O_2
4. Which of the following decreases when a given mass of gas is compressed to half its initial volume?
- average intermolecular distance
 - frequency of collision
 - number of molecules present
 - atomic radius of each particle
5. The densities of two gases X and Y are 2.5gdm^{-3} and 10.0gdm^{-3} respectively. What is the rate of diffusion of X relative to Y?
- 1:2.5
 - 2.5:1
 - 1:2
 - 2:1
6. The properties of elements are periodic functions of their
- atomic number
 - atomic radius
 - atomic volume
 - mass number
7. Which of the following solutions containing only hydroxyl ions will liberate hydrogen gas when reacted with Mg metals?
- $1.0 \times 10^{-5}\text{moldm}^{-3}$
 - $1.0 \times 10^{-10}\text{moldm}^{-3}$
 - $1.0 \times 10^{-3}\text{moldm}^{-3}$
 - $1.0 \times 10^{-2}\text{moldm}^{-3}$
8. In the redox reaction
- $$2\text{Fe}^{2+} + \text{Cl}_2 \rightarrow 2\text{Fe}^{3+} + 2\text{Cl}^-$$
- Cl_2 is reduced because it has lost electrons
 - Cl_2 is reduced because its oxidation number has

- decreased
C. Fe^{2+} is reduced because it has lost electrons
D. Fe^{2+} is reduced because it has gained electrons
9. During electrolysis of molten sodium chloride,
A. chlorine atom gains an electron
B. chloride ion gains an electron
C. chloride ion is oxidized
D. sodium ion is oxidized
10. Coffee stains are removed with
A. turpentine B. ammonia
C. borax in water D. kerosene
11. What is the value of ΔH for this reaction?
$$\text{Fe}_2\text{O}_{3(s)} + 3\text{H}_2\text{O}_{(l)} \rightarrow 2\text{Fe(OH)}_{3(s)}$$
- | Substance | ΔH_f (kJ/mol) |
|------------------------------|-----------------------|
| $\text{Fe}_2\text{O}_{3(s)}$ | - 824.2 |
| $\text{Fe(OH)}_{3(s)}$ | - 823.0 |
| $\text{H}_2\text{O}_{(l)}$ | - 285.8 |
- A. 35.6 KJ B. 286.0 KJ
C. 858.6 KJ D. - 536 KJ
12. $\text{N}_2\text{O}_{4(g)} \rightleftharpoons 2\text{NO}_{(g)}$ $\Delta H = +ve$
What happens to the equilibrium constant of the reaction above if the pressure is increased?
A. it becomes zero B. it decreases
C. it increases D. it is unaffected
13. Radioisotopes are used for the following EXCEPT
A. development of photographic films
B. generation of electricity
C. radio carbon dating
D. tracers in chemical reactions
14. The common characteristics shared by iron and aluminium is that both
A. are extracted by reduction method
B. form only basic oxides
C. show oxidation states of +2 and +3
D. form soluble hydroxides
15. In the reaction: $\text{H}_3\text{C}-\text{C}\equiv\text{CH} + 2\text{HBr} \rightarrow \text{X}$,
X is
A. $\text{CH}_3\text{CBr}_2\text{CH}_3$ B. $\text{CH}_3\text{CH}_2\text{CHBr}_2$
C. $\text{CH}_3\text{CHBrCHBr}$ D. $\text{CH}_3\text{BrCH}_2\text{CH}_2\text{Br}$

CHEMISTRY 2010/2011 ANSWERS

1. Crystallization is used in industries where purity of products is important as in the manufacture of drugs and sugar production. This is not so with precipitation which tends to bring other solutes out of solution. **Ans. A**

2. A chemical change is one which is not easily reversed and in which new substances are formed. **Ans. D**

	Iron, Fe	Oxygen, O
	72.36%	27.64%
	<u>72.36</u>	<u>27.64</u>
	56	16
	1.2929	1.7275
	<u>1.2929</u>	<u>1.7275</u>
	1.2929	1.2929
	<u>1</u>	<u>1.34</u> ≈ 1

Therefore, the empirical formula is FeO .

Ans. A

Compare with year 2006/07, Question no 2.

4. Decrease in volume decreases the space which the gas molecules travel (that is, intermolecular distance). This in turn increases the rate or frequency of collision. **Ans. A**

$$D_s = 2.5 \text{ g/dm}^3, D_v = 10 \text{ g/dm}^3$$

$$\frac{R_s}{R_v} = \sqrt{\frac{D_v}{D_s}} = \sqrt{\frac{10}{2.5}} = \frac{2}{1}$$

$$\text{Therefore, } R_s : R_v = 2 : 1$$

Ans. D

6. The modern periodic law states that the properties of the elements are a periodic function of their atomic numbers. **Ans. A**

$$7. \text{H}^+ \times \text{OH}^- = 10^{-14}$$

But when $\text{OH}^- = 1 \times 10^{-3} \text{ mol/dm}^3$,

$$\text{H}^+ = \frac{10^{-14}}{1 \times 10^{-3}} = 1 (10^{-14+13})$$

$$\text{pH} = -[\log_{10} 1 \times \log_{10} 10^{-1}] = 1$$

Therefore

Ans. B

8. Considering REDOX in terms of oxidation state, oxidation is the increase in oxidation number while reduction is the decrease in oxidation number from left to right of an equation. **Ans. B**

9. During the electrolysis of molten sodium chloride, chlorine is discharged (at the anode) as follows:



SUCCESS QUOTE "Success is dependent on effort."
-Sophie K.



Notice that Cl is oxidized to Cl₂ by the loss of e⁻.

Ans. C

10. Ans. C

11. $\Delta H = \text{Heat contents of products} - \text{Heat contents of reactants}$

$$= 2(-823) - [-824.2 + 3(-285.8)]$$

$$= -1646 - (-824.2 - 857.4)$$

$$= -1646 - (-1681.6)$$

$$= -1646 + 1681.6 = 35.6\text{KJ}$$

Ans. A

12. Temperature change is the only factor that affects equilibrium constant. This is because equilibrium constant is affected by enthalpy and it is only temperature change that can effect enthalpy change. This means that concentration change, change in pressure, and even application of catalyst, have no effect on the equilibrium constant of a reversible reaction. Ans. D

13. Ans. A

14. Note that option B is not correct because aluminium oxide reacts readily with dilute acids and strong alkalis to form salts, i.e. it is amphoteric. Ans. D

15. The given reaction is an addition reaction. Going by the regioselectivity predicted by Markovnikov's rule, the H will add to the C with the most H already present. Ans. A

For more on Markovnikov's rule, go to Chemistry 101 (Quick Revision Aid), No 54.

SUMMARY OF ANSWERS

[CHEMISTRY 2010/2011]

1.A	2.D	3.A	4.A	5.D
6.A	7.B	8.B	9.C	10.C
11.A	12.D	13.A	14.D	15.A

SUCCESS QUOTE

"Do not lower your goals to the level of your abilities. Rather, raise your abilities to the height of your goals. Learn to dream big and take responsibility for the actualization of your dreams!"

~ Henry Divine

CHEMISTRY 2011/2012 QUESTIONS

1. Addition of water to calcium oxide leads to

A. a physical change

B. a chemical change

C. the formation of a mixture

D. an endothermic reaction

2. 15 g of impure Na₂CO₃ reacted with excess HNO₃.

If 0.1 mole of CO₂ is produced, what is the percentage purity of the Na₂CO₃? [Na = 23, C = 12, O = 16]

A. 35.3%

B. 10.0%

C. 70.66%

D. 90.0%

3. 0.14 g of a hydride of carbon occupies 112.0 cm³

at STP when evaporated. The ratio of carbon to hydrogen is 1:2. The relative molecular formula is

A. C₂H₄

B. C₃H₆

C. C₄H₈

D. C₆H₁₂

4. A gas X diffuses twice as fast as a gas Y under the same conditions. If the relative molecular mass of Y is 112, calculate the relative molecular mass of X.

A. 28

B. 14

C. 56

D. 120

5. In the periodic table, what is the property that decreases along the period and increases down the group?

A. Atomic number

B. Electron affinity

C. Ionization potential

D. Ionic radius

6. 10 cm³ of 0.1 M HCl are added to 10 cm³ of NaOH solution containing 8 g of NaOH per dm³ of solution. What is the pH of the resulting solution?

A. 11

B. 13

C. 7

D. 8

7. What is the formula of sodium gallate if gallium (Ga) shows an oxidation number of +3?

A. NaGaO₃

B. Na₂Ga(OH)₂

C. NaGa(OH)₃

D. NaGa(OH)₄

8. The mass of Ag deposited when a current of 10 A is passed through a solution of silver salt for 4830 secs is [Ag = 108, 1F = 96500C]

A. 54.0 g

B. 27.0 g

C. 13.5 g

D. 108.0 g

9. The solubility of alkanols in water is due to

A. their covalent nature

B. hydrogen bond

C. their low boiling point

D. their ionic character

10. If a reaction is exothermic and there is a great disorder, it means

- A. the reaction is in a state of equilibrium
B. there will be a large increase in free energy
C. there will be a large decrease in free energy
D. the reaction is static

11. In what way is the equilibrium constant for the forward reaction related to that of the reverse reaction?

- A. the two equilibrium constants are identical
B. the product of the two is expected to be one
C. the product of the two is always greater than one
D. the addition of the two is expected to be one

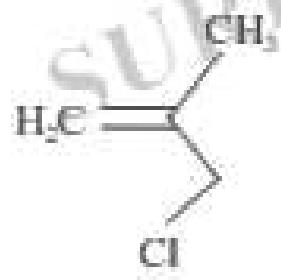
12. Natural radioactivity is the random spontaneous disintegration of the nucleus of heavy isotopes of certain elements with the emission of

- A. α , β and X-rays B. α , β and γ -rays
C. α , X and γ -rays D. β , X and γ -rays

13. Mg ribbon was allowed to burn inside a given gas P leaving a white solid residue Q. Addition of water to Q liberated a gas which produces dense white fumes with a drop of hydrochloric acid.

- The gas P was
A. Nitrogen B. Chlorine
C. Oxygen D. Sulphur(IV) oxide

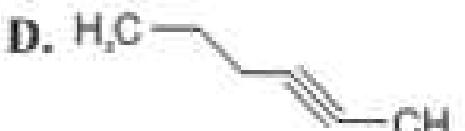
14. The IUPAC name for the compound



is

- A. 1-chloro-2-methylprop-2,3-ene
B. 1-chloro-2-methylprop-2-ene
C. 3-chloro-2-methylprop-1-ene
D. 3-chloro-2-methylprop-1,2-ene

15. Which of the following behaves like ethyne?



SUCCESS QUOTE

"Perseverance is the hard work you do after you get tired of doing the hard work you already did."

~ Newt Gingrich

CHEMISTRY 2011/2012 ANSWERS

1. Calcium oxide (and oxides of potassium and sodium) react with water to form hydroxides. That's a chemical change.



2. $\text{Na}_2\text{CO}_3 + 2\text{HNO}_3 \longrightarrow 2\text{NaNO}_3 + \text{CO}_2 + \text{H}_2\text{O}$

From the equation above,

$$\text{Na}_2\text{CO}_3 = (2 \times 23) + 12 + (16 \times 3) = 106\text{g/mol}$$

$$\text{CO}_2 = 12 + (16 \times 2) = 44\text{g/mol}$$

Mass = mole x molar mass

$$\text{Mass of CO}_2 = 0.1\text{mol} \times 44\text{g/mol} = 4.4\text{g}$$

106g of Na_2CO_3 produces 44g of CO_2 .

xg of Na_2CO_3 will produce 4.4g of CO_2 ,

$$\text{i.e. } x = \frac{106\text{g} \times 4.4\text{g}}{44\text{g}} = 10.6\text{g of pure Na}_2\text{CO}_3$$

$$\% \text{ Purity} = \frac{\text{mass of pure}}{\text{mass of impure}} \times \frac{100}{1}$$

$$\% \text{ Purity} = \frac{10.6\text{g}}{15\text{g}} \times \frac{100}{1} = 70.66\%$$

Ans. C

3. 0.14g of $\text{CH}_2 \longrightarrow 112\text{cm}^3$ at s.t.p

$$x\text{g of CH}_2 \longrightarrow 22400\text{cm}^3$$
 at s.t.p

$$\text{i.e. } \frac{0.14\text{g} \times 22400\text{cm}^3}{112\text{cm}^3} = 28\text{g of CH}_2$$

$$\text{Therefore, } (\text{CH}_2)_n = (12 + 2 \times 1)_n = 28$$

$$14n = 28, n = 2.$$

$$(\text{CH}_2)_2 = \text{C}_2\text{H}_4$$

Molecular formula = C_2H_4 Ans. A

4. $R_n = 2, R_1 = 1, M_n = 112, M_1 = ?$

$$\frac{R_n}{R_1} = \frac{\sqrt{M_n}}{\sqrt{M_1}} \longrightarrow \frac{2}{1} = \frac{\sqrt{112}}{\sqrt{M_1}}$$

$$2\sqrt{M_1} = \sqrt{112} \longrightarrow M_1 = \left(\frac{\sqrt{112}}{2}\right)^2 = 28 \quad \text{Ans. A}$$

5. Down the groups, additional layers of electrons are being added causing the ionic radius to increase.

Across the periods, the ionic radius decreases for metals forming cations, as the metals lose their outer electron orbitals. The ionic radius increases for non-metals as the effective nuclear charge decreases due to the number of electrons exceeding the number of protons.

Ans. D

6. $\text{HCl} + \text{NaOH} \longrightarrow \text{NaCl} + \text{H}_2\text{O}$

$n = CV$

For HCl,

$$\frac{0.1\text{mol}}{\text{dm}^3} \times \frac{10\text{dm}^3}{1000} = 0.001\text{mole}$$

For NaOH,

$$\text{mol/dm}^3 = \frac{\text{g/dm}^3}{\text{MM}}$$

$$\text{MM of NaOH} = 23 + 16 + 1 = 40\text{g/mol}$$

$$\begin{aligned}\text{mol/dm}^3 \text{ of NaOH} &= \frac{8\text{g/dm}^3}{40\text{g/mol}} \\ &= 0.2\text{mol/dm}^3\end{aligned}$$

but $n = CV$,

$$\frac{0.2\text{mol}}{\text{dm}^3} \times \frac{10\text{dm}^3}{1000} = 0.002\text{mole of NaOH}$$

Therefore,

$$\begin{aligned}0.001\text{mol of HCl} + 0.002\text{mol of NaOH} \\ \rightarrow 0.001\text{mol of NaOH} + 1\text{mol of NaCl} + \text{H}_2\text{O}\end{aligned}$$

This implies that the resulting solution is essentially basic.

$$0.001\text{mole of NaOH} = 1 \times 10^{-3}\text{mole of OH}^-$$

$$\text{PH} + \text{POH} = 14, \text{PH} = 14 - \text{POH}$$

$$\text{But POH} = -\log[\text{OH}^-] = -\log[1 \times 10^{-3}] = 3$$

$$\therefore \text{PH} = 14 - 3 = 11 \quad \text{Ans. A}$$

7. Using the method below, test each of the formulas in the options to note the one in which gallium shows an oxidation number of +3.

Recall that the oxidation numbers of O, H and Na are -2, +1 and +1 respectively.

$$\text{NaGa(OH)}_4 = 0$$

$$1 + \text{Ga} + (-2 \times 4) + (+1 \times 4) = 0$$

$$1 + \text{Ga} - 8 + 4 = 0$$

$$\text{Ga} + 1 - 4 = 0$$

$$\text{Ga} - 3 = 0$$

$$\text{Ga} = +3 \quad \text{Ans. D}$$

8. $\text{Ag}^+ + e^- \rightarrow \text{Ag}$ (where $e^- = 1F = 96500C$)

$$Q = It = 10 \times 4830 = 48300C$$

108g of Ag is discharged by 96500C

xg of Ag will be discharged by 48300C

$$\text{i.e. } \frac{108\text{g} \times 48300\text{C}}{96500\text{C}} = 54.05\text{g of Ag}$$

Ans. A

9. Alkanols are compounds that contain the O-H (functional) group of atoms attached to a

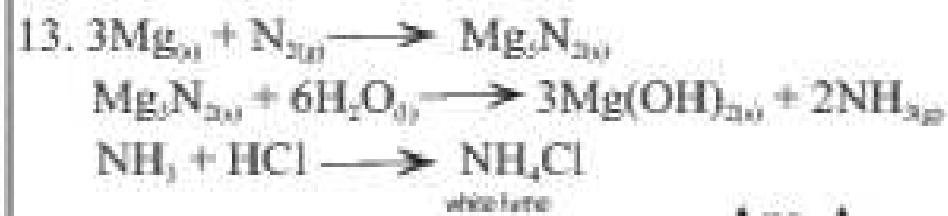
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hydrocarbon chain. The solubility of alkanols in water is due to the hydrogen bonds formed between water and the hydroxy group (O-H). Ans. B

10. If a reaction is exothermic and results in a great disorder, the combined changes in the enthalpy and entropy will lead to a large decrease in free energy, making the reaction to be spontaneous. Ans. C

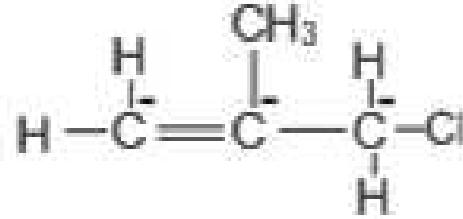
11. Ans. B *For detailed explanation, go to the Answer to Question no 9, of year 2005/2006.*

12. Ans. B



Ans. A

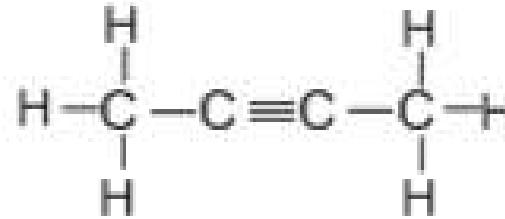
14. We redraw the compound for clarity.



3-chloro-2-methylprop-1-ene

Ans. C

15. This behaves like ethyne



Ans. B

SUMMARY OF ANSWERS

[CHEMISTRY 2011/2012]

1.B	2.C	3.A	4.A	5.D
6.A	7.D	8.A	9.B	10.C
11.B	12.B	13.A	14.C	15.B

SUCCESS QUOTE

"Whenever you get tired,
learn to persevere."

~ Henry Divine

CHEMISTRY 2012/2013 QUESTIONS

1. Which of the following statements is incorrect?
 - A. The addition of water to quicklime is an example of a physical change
 - B. A chemical change is irreversible and a new substance is formed
 - C. A physical change can easily be reversed and no new substances are formed
 - D. Separating a mixture by distillation is an example of physical change
2. 20 g of calcium trioxocarbonate(IV) is heated to a constant mass and 11.2 g of calcium oxide is left as residue. The mass of the gaseous product left is
[Ca = 40, C = 12, O = 16]
 - A. 11.2 g
 - B. 44 g
 - C. 2.2 g
 - D. 8.8 g
3. The vapour pressure of water at 15 °C is 13 mmHg. At a barometric pressure of 747 mmHg, 2 dm³ of nitrogen gas is collected over water at 15 °C. The pressure of nitrogen gas is
 - A. 760 mmHg
 - B. 747 mmHg
 - C. 734 mmHg
 - D. 114.3 mmHg
4. Elements X, Y and Z belong to groups I, V and VI respectively. Which of the following is TRUE about the bond types of XZ and YZ?
 - A. Both are electrovalent
 - B. Both are covalent
 - C. XZ is electrovalent and YZ, is covalent
 - D. XZ is covalent and YZ, is electrovalent
5. Which of the following is a double salt?
 - A. K₂Fe(CN)₆
 - B. KAl(SO₄)₂.12H₂O
 - C. Pb(OH)₂.2PbCO₃
 - D. KHSO₄
6. Find the value of n in the equation
$$XO_3^n + 4H^+ + 3e^- \longrightarrow XO + 2H_2O$$
 - A. 1
 - B. 2
 - C. 3
 - D. 5
7. Corrosion in metals is an example of
 - A. electrochemical process
 - B. half-cell reaction
 - C. metal-plating device
 - D. metal coupling device

8. An example of a suspension of solid particles in a gas is
 - A. Harmattan
 - B. Aerosol spray
 - C. Fogs
 - D. Emulsion
9. In which of the following is the change in entropy positive?
 - A. $2H_2O_{(l)} + SO_{(g)} \longrightarrow 2H_2O_{(g)} + 3S_{(s)}$
 - B. $H_2O_{(g)} \longrightarrow H_2O_{(l)}$
 - C. $N_{(g)} + 3H_{(g)} \longrightarrow 2NH_{(g)}$
 - D. $Cu^{2+}_{(aq)} + Fe_{(s)} \longrightarrow Fe^{2+}_{(aq)} + Cu_{(s)}$
10. $2SO_{(g)} + O_{(g)} \rightleftharpoons 2SO_{(g)} \quad \Delta H = -ve$
The formation of SO₃ in the equation above will be favoured by
 - A. addition of SO₂
 - B. high pressure
 - C. high temperature and low pressure
 - D. high temperature and addition of catalyst
11. When $^{238}_{92}U$ emits an x-ray and a β-ray, the product X has a mass number and an atomic number respectively
 - A. 234 and 90
 - B. 234 and 91
 - C. 230 and 88
 - D. 238 and 93
12. The producer gas is a mixture of
 - A. CO and CO₂
 - B. CO and N₂
 - C. CO and H₂
 - D. CO and CO₂
13. The IUPAC name of the compound below is H₃CCH(CH₃)CHCHCH₃
 - A. Hex-2-ene
 - B. 2-methylpent-4-ene
 - C. Hex-3-ene
 - D. 4-methylpent-2-ene
14. Ethanol reacts with aqueous Sodium oxoiodate(I) to give a bright yellow solid with a characteristic smell. The product is
 - A. trichloromethane
 - B. triiodomethane
 - C. iodoethane
 - D. ethanal
15. Plastics which lose their plasticity on being subjected to heat are said to be
 - A. biodegradable
 - B. polymeric
 - C. thermosets
 - D. thermoplastics

CHEMISTRY 2012/2013 ANSWERS

1. Addition of water to quicklime is a chemical change.



2. $\text{CaCO}_3 \longrightarrow \text{CaO} + \text{CO}_2$

$$\text{CaCO}_3 = 40 + 12 + (16 \times 3) = 100\text{g/mol}$$

$$\text{CO}_2 = 12 + (16 \times 2) = 44\text{g/mol}$$

$$100\text{g of CaCO}_3 = 44\text{g of CO}_2$$

$$20\text{g of CaCO}_3 = ?$$

$$\text{i.e. } \frac{20 \times 44}{100} = 8.8\text{g of CO}_2$$

Ans. D

3. $P_{\text{atm}} = P_{\text{water}} + P_{\text{sample}}$

$$747 = 13 + P_{\text{sample}}$$

$$P_{\text{sample}} = 747 - 13 = 734\text{mmHg}$$

To calculate the partial pressure of a gas collected over water, simply subtract the partial pressure of water vapor from the total pressure at which the sample was collected Ans. C

4. Ans. C

5. Double salts are salts which ionize to produce three different types of ions in solution. Usually two of these are positively charged (metallic or ammonium ions), while the other is negatively charged.



Ans. B

6. $\text{XO}_4^- + 4\text{H}^+ + 3e^- \longrightarrow \text{XO} + 2\text{H}_2\text{O}$

$$-n + 4 - 3 = 0; -n + 1 = 0$$

$$-n = -1; n = 1 \quad \text{Ans. A}$$

7. The corrosion process is essentially an oxidation or anodic half cell reaction in which metal atoms are transformed to their ions, resulting in weight loss or thinning of the solid material. Ans. B

8. Note that a suspension is a heterogenous mixture of undissolved particles in a given medium. The particles are usually large enough to be seen without

the aid of an instrument, and they eventually settle down if left standing. Harmattan is an example of a suspension of dust and fine sand particles in the air.

Ans. A

9. Entropy is the measure of the disorder of a system. A highly ordered system has low entropy. For example,

a block of ice will increase in entropy as it melts.

To predict the sign of the entropy change of a reaction, we note that entropy of a reaction refers to the positional probabilities for each reactant. An atom in gas phase has more options for position than the same atom in a solid phase. This is why gases have more entropy than solids.

In reactions, the positional probabilities must be compared for all the reactants to the products produced.

If the reaction involves only gases, the entropy is related to the total number of moles on either side of the reaction. A decrease in the number of moles on the product side means lower entropy. An increase in the number of moles on the product side means higher entropy.

If the reaction involves multiple phases, the production of a gas typically increases the entropy much more than any increase in moles of a liquid or solid.

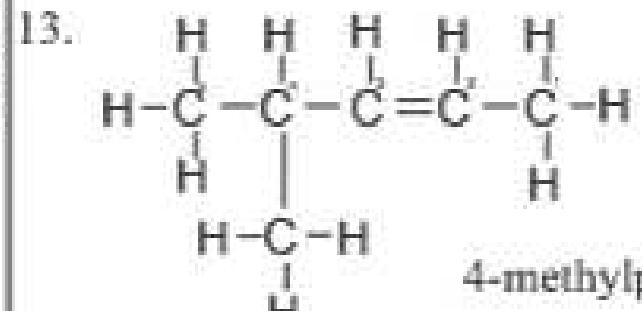
Ans. B



Increase in the pressure of the above reaction will favour the forward reaction.

Ans. B

11. Ans. D



4-methylpent-2-ene Ans. D

14. Aqueous sodium oxoiodate(I) is a strong oxidizing agent which oxidizes ethanol to ethanal in limited supply. Ethanal is a colourless liquid with a characteristic pungent, fruity smell. Ans. D

15. In polymer chemistry, the term *plastic* refers to any polymer that can be molded when hot and retains its shape when cooled.

Thermosets are polymers that can be molded when they are first prepared, but once cooled, harden irreversibly and cannot be successfully reheated/remelted or remolded. *Thermoplastics* soften when heated and harden/strengthen after cooling. They can be heated, shaped and cooled as often as necessary without causing a chemical change, while *thermosets* will burn when heated after the initial molding.

Ans. C

**SUMMARY OF ANSWERS
[CHEMISTRY 2012/2013]**

- | | | | | |
|------|------|------|------|------|
| 1.A | 2.D | 3.C | 4.C | 5.B |
| 6.A | 7.B | 8.A | 9.B | 10.B |
| 11.D | 12.B | 13.D | 14.D | 15.C |

BONUS TIP

During study times, make study your only focus.

You will need to sacrifice every other thing including Whatsapp, Facebook, video games and TV for the sake of study. When you only have one focus for your mind, your mind will specialize to help you study effectively. I know that it might be difficult to let go of certain things due to them being habits, but you must realize that studying effectively is critical to success in UTME and post-UTME.

CHEMISTRY 2012/2013 QUESTIONS [2]

1. 1g of compound X (m.pt. 122 °C) is added to 100g of another compound Y (m.pt. 95°C). Which of the following is likely to be the melting point of the mixture?
A. 95 °C B. 120 °C
C. 96 °C D. 94 °C
2. The density of a certain gas is 1.98 gdm⁻³ at s.t.p. What is the molecular mass of the gas? [GMV = 22.4dm³]
A. 26.0 g B. 31.0 g
C. 54.0 g D. 44.0 g
3. When a substance changes from liquid state to gaseous state, the attractive force between the molecules
A. increases B. decreases
C. remains the same D. fluctuates
4. A species *W* has 16 protons, 17 neutrons and 18 electrons. *W* must be
A. a neutral atom of a metal
B. a cation of two positive charges
C. an anion of one negative charge
D. an anion of two negative charges
5. A solution of NaOH containing 6.0 g in 250 cm³ of solution has a concentration of
A. 0.04 moldm⁻³ B. 0.15 moldm⁻³
C. 0.60 moldm⁻³ D. 0.96 moldm⁻³
6. When CO₂ is passed through clear limewater it turns milky. Which of the following statements is correct of the limewater?
A. The clear limewater is harder than the one turned milky by CO₂,
B. The clear limewater is softer than the one turned milky by CO₂,
C. CO₂ causes the hardness of the limewater
D. The clear limewater is soft water
7. Heat content difference between the products and reactants of a chemical reaction is called
A. activation energy B. endothermic reaction
C. exothermic reaction D. enthalpy change
8. The concentration of iodine in the equilibrium

mixture can be increased by



- A. raising the pressure
- B. lowering the pressure
- C. raising the temperature
- D. lowering the temperature

9. Which of the following statements is CORRECT about the difference between nuclear reaction and chemical reaction?

- A. Heat energy is emitted in nuclear reaction but not in chemical reaction
- B. New substances are formed in nuclear reaction while in chemical reaction no new substances are formed
- C. Rays are emitted in nuclear reaction but not in chemical reaction
- D. Chemical reaction involves changes in orbital electrons while nuclear reaction affects only the nucleus

10. The alloy used for metal work and plumbing contains

- A. Aluminium and Copper
- B. Iron and Carbon
- C. Iron and Nickel
- D. Lead and Tin

11. Which of the following compounds will undergo thermal dissociation?

- A. AgCl
- B. CaCO₃
- C. K₂SO₄
- D. NH₄Cl

12. CH₃C(CH₃)₂CH₂CH(CH₃)₂

The IUPAC name of the compound above is

- A. 2,2,4-trimethylpentane
- B. 4,4,2-trimethylpentane
- C. Octane
- D. 2,4-dimethylhexane

13. Which of the following pairs are isomers?

- A. 1-propanol and methoxyethane
- B. 1-propanol and propanal
- C. 2-propanol and propanone
- D. 2-propanol and propanal

14. When two drops of Million's reagent was added to a

substance X in a test tube, a white ppt which turns brick-red on heating was formed. To which of the following does X belong?

- A. Carbohydrates
- B. Fats and oils
- C. Vitamins
- D. Proteins

15. Which of the following is not an addition polymer?

- A. Bakelite
- B. Neoprene
- C. PVC
- D. Perspex

BONUS TIP

"Now admitting over 9000 students every year, UNN is one of the few federal schools in Nigeria where aspirants have the highest chances of gaining admission. If you are seeking admission in UNN, you must not let yourself be discouraged by the negative stories of people who have tried and failed in the past. Don't ever agree with them when they tell you that you must know someone in the school before you can enter. You can gain admission to your dream course *purely on merit*. All you need is to always stay informed by regularly checking the website www.suresuccess.ng, work very hard and smart, pray earnestly and watch your admission dreams come to reality. Wishing you the very best."

~ Henry Divine

CHEMISTRY 2012/2013 ANSWERS [2]

1. Note that the melting point of a substance is the temperature at which the material changes from a solid to a liquid state. Melting point is a criterion used for determining the purity level of solid substances. *Pure solid substances have a clear sharply defined melting point.* The presence of impurities (contaminants) cause a depression in melting points. The reason for this depression is that contaminants disrupt the consistency and organization of the crystal lattice at the molecular level. Contaminants don't "fit" correctly into what would be the normal pure lattice.

For liquids, the criterion for determining the purity level of samples is the boiling point or relative density. Ans. D

2. Density = $\frac{\text{mass}}{\text{volume}}$

1 mole of any gas at stp = 22.4 dm^3
mass = $1.98 \text{ g/dm}^3 \times 22.4 \text{ dm}^3 = 44.352 \text{ g}$
but $n = \frac{\text{mass}}{\text{molar mass}}$, where $n = 1$
Therefore, molar mass = $\frac{44.35}{1} = 44.35 \text{ g}$

Ans. D

3. When a substance changes from liquid state to a gaseous state the attractive force between the molecules decreases. Ans. B

4. Note that for a neutral atom, the number of protons equals the number of electrons. Anions accept electrons during chemical combination which gives them negative charges. Ans. D

5. 6.0g of NaOH $\rightarrow 250 \text{ cm}^3$
 $x \text{ g of NaOH} \rightarrow 1000 \text{ cm}^3$
i.e. $\frac{6.0 \text{ g} \times 1000 \text{ cm}^3}{250 \text{ cm}^3} = 24 \text{ g/dm}^3$

molar mass of NaOH = $23 + 1 + 16 = 40 \text{ g/dm}^3$
concentration of NaOH = $\frac{24 \text{ g/dm}^3}{40 \text{ g/mol}} = 0.60 \text{ mol/dm}^3$ Ans. C

6. CO_2 precipitates the soluble $\text{Ca}(\text{HCO}_3)_2$ out of solution in form of insoluble CaCO_3 . Ans. C

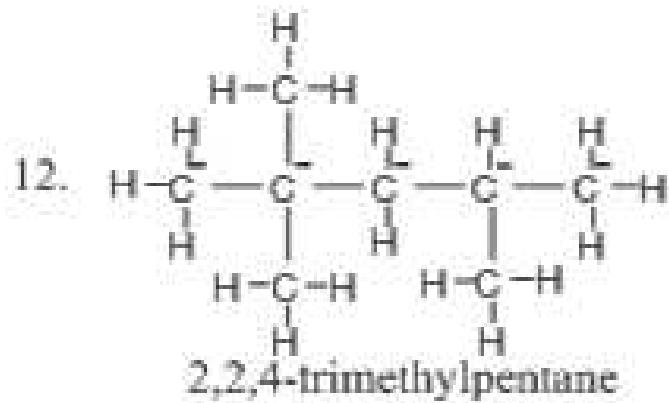
7. Enthalpy is the heat content of any reaction.
 $\Delta H = H_p - H_r$ (where ΔH = change in enthalpy, H_p = heat content of product, H_r = heat content of reactant). Ans. D



Though all the molecules are in the gaseous phase, a change in pressure will not affect the reaction because the total number of moles on the left hand side is equal to the total number of moles on the right hand side of the equation. Increase in temperature will increase the concentration of iodine because the forward reaction is endothermic. Ans. C

9. Rays (alpha, gamma and beta rays) are all emitted in nuclear reactions but not in chemical reaction. [C]

10. The alloy used for metal work and plumbing contains soft solder which is made up of 50-70% lead and 30-50% tin. Ans. D



13. 1-propanol and methoxyethane are isomers with molecular formula $\text{C}_2\text{H}_5\text{O}$. Actually, they are a variety of isomers called *functional group isomers* i.e. they have the same molecular formula but different functional groups. Ans. A

14. When drops of Millon's reagent are added to proteins, a white ppt (which turns brick-red on heating) is formed. This is one of the laboratory

tests for proteins.

Ans. D

15. An *addition polymer* is a polymer which is formed by an addition reaction, where many monomers bond together via rearrangement of bonds without the loss of any atom or molecule. This is in contrast to a *condensation polymer* which is formed by a condensation reaction where a molecule, usually water, is lost during the formation. Perspex, PVC and neoprene are addition polymers. Ans. A

SUMMARY OF ANSWERS (CHEMISTRY 2012/2013 (2))

1.A	2.D	3.B	4.D	5.C
6.C	7.D	8.C	9.C	10.D
11.B	12.A	13.A	14.D	15.A

SUCCESS QUOTE

"You were born to win, but to be a winner, you must plan to win, prepare to win and expect to win."

- Zig Ziglar

CHEMISTRY 2013/2014 QUESTIONS

1. Which of the following can be classified as a 'fine' chemical?
A. H_2SO_4 B. AgBr
C. NaOH D. $\text{CH}_3\text{CH}_2\text{OH}$
2. The soap lather is a
A. gas dispersed in a liquid
B. liquid dispersed in a gas
C. solid dispersed in a liquid
D. liquid dispersed in a liquid
3. Given that the pH of a solution of KOH is 12, what is the concentration of the OH^- ions?
A. $0.01 \text{ mol}/\text{dm}^3$ B. $1 \times 10^{-12} \text{ mol}/\text{dm}^3$
C. $1 \times 10^{-14} \text{ mol}/\text{dm}^3$ D. $1 \times 10^{-1} \text{ mol}/\text{dm}^3$
4. Which of the following salts will produce an aqueous solution with a pH less than 7?
A. Na_2SO_4 B. Na_2CO_3
C. CuSO_4 D. K_2CO_3

5. The burning of phosphorus in excess oxygen is represented by the equation



What is the volume of oxygen at STP required for the complete oxidation of 18.6g of phosphorus? [P = 31, O = 16, Molar Volume of a gas at STP = 22.4 dm^3]

- A. 5.6 dm^3 B. 11.2 dm^3
C. 16.8 dm^3 D. 20.2 dm^3

6. All the following are redox reactions EXCEPT

- A. $\text{Zn} + \text{H}_2\text{SO}_4 \longrightarrow \text{ZnSO}_4 + \text{H}_2$
B. $\text{Ca}(\text{HCO}_3)_2 \longrightarrow \text{CaCO}_3 + \text{H}_2\text{O} + \text{CO}_2$
C. $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
D. $2\text{HNO}_3 + 2\text{HI} \longrightarrow 2\text{H}_2\text{O} + 2\text{NO} + \text{I}_2$

7. In which of the following pairs of metals are the two members extracted by electrolysis?

- A. copper and zinc
B. lead and calcium
C. magnesium and zinc
D. magnesium and calcium

8. Consider the gases: CO, SO₂, H₂S, NO₂ and O₂. The increasing order of rates of diffusion of equal volumes of the gases through a porous plug under the same conditions is....

- [H = 1; C = 12; N = 14; O = 16; S = 32]
A. H₂S, CO, NO₂, SO₂ and O₂
B. O₂, SO₂, H₂S, CO, and NO₂
C. SO₂, NO₂, H₂S, O₂ and CO₂
D. CO, O₂, H₂S, NO₂ and SO₂

9. C₆H₁₄ and C₆H₁₂O₆ are both covalent. C₆H₁₂O₆ is soluble in water while C₆H₁₄ is insoluble. This is because C₆H₁₂O₆

- A. contains stronger 'Van der Waals' forces
B. has a higher molecular mass
C. has a considerable ionic character
D. forms hydrogen bonds with the solvent

10. The performance of a fuel is the same as that of a mixture of 60 g of 2,2,4-trimethylpentane and 40 g of heptane. What is the octane number of the fuel?

- A. 100 B. 60
C. 20 D. 40

SUCCESS QUOTE

"Life doesn't require that we be the best, it only requires that we try our best."

~Jackson Brown

CHEMISTRY 2013/2014 ANSWERS

1. A 'fine' chemical is one that is produced in relatively small amounts and used only in few and specialized sectors. AgBr is one of such chemicals and is used mainly in the photographic industry. The other chemicals given (H_2SO_4 , NaOH and CH_3CH_2OH) are used commonly in large quantities. They are 'heavy' chemicals. **Ans. B**

2. Soap lather is a colloidal system in which air (gas) is the *dispersed phase* and soap solution (liquid) is the *dispersion medium*. Note that the dispersed phase is the component of a colloidal solution which is present in smaller proportion while the dispersion medium is the component which is present in excess and acts as a medium in which the solute particles are dispersed. **Ans. A**

3. **Ans. A** (For detailed solution, go to the answer to question no 5 of year 2008/09.)

4. None of the ions (Na^+ and SO_4^{2-}) produced by aqueous Na_2SO_4 can undergo hydrolysis, hence the aqueous solution is neutral ($pH = 7$). The CO_3^{2-} ions produced by the aqueous solution of Na_2CO_3 or K_2CO_3 can undergo anionic hydrolysis to yield excess OH^- in solution. Thus the aqueous solution of Na_2CO_3 or K_2CO_3 is basic ($pH > 7$). In aqueous solution of $CuSO_4$, the Cu^{2+} ions can undergo cationic hydrolysis to yield excess H^+ ions in solution. Hence, the aqueous solution of $CuSO_4$ is acidic ($pH < 7$).



Compare with Question no 6 of 2008/09 and Question no 7 of 2009/10.



Molar mass of P_4 = $(31 \times 4) = 124\text{g mol}^{-1}$
No of moles of phosphorus oxidized = $\frac{\text{mass}}{\text{MM}}$
 $= \frac{18.6\text{g}}{124\text{g mol}^{-1}} = 0.15\text{mol}$

From the equation,

1 mole of phosphorus requires 5 moles of oxygen
 $\therefore 0.15$ mole phosphorus will require
 (5×0.15) mole of oxygen
 $= 0.75$ mole of Oxygen.

But 1 mole of oxygen at s.t.p occupies 22.4dm^3
 $\therefore 0.75$ mole of oxygen at s.t.p will occupy
 $(0.75 \times 22.4) \text{ dm}^3$
 $= 16.8\text{dm}^3$

Ans. C

6. Considering the reaction



in terms of the definition of REDOX given in the answer to Question no 8 of year 2010 (day 1), we notice that none of the elements experiences a change in oxidation number in going from the reactant to product state. Hence, the reaction is a non-redox reaction. **Ans. B**

7. The method used to extract metals from the ore in which they are found depends on their reactivity or position in the reactivity series. Reactive metals such as aluminium and those above it in the series (Mg, Ca, Na, K) are extracted by electrolysis, while the less-reactive ones (such as Zn, Fe, Pb, Cu) may be extracted by reduction with carbon or carbon monoxide. **Ans. D**

8. There is an inverse relationship between the rate of diffusion of a gas and its molecular mass. The lower the molecular mass, the more rapidly it diffuses. The increasing order of rates of diffusion is the decreasing order of the molecular masses of the gases. **Ans. C**

9. Note that covalent compounds usually dissolve in nonpolar solvents and not in polar solvents like water. The presence of hydroxyl (OH) groups and aldehyde (CHO) group in glucose ($C_6H_{12}O_6$) makes it polar and increases its tendency to form hydrogen bond with water. So $C_6H_{12}O_6$ is soluble in water because both can form hydrogen bond with each other. **Ans. D**

10. Octane number system is the scale according to which the grade or quality of petrol is measured. This is given by the percentage of 2,2,4-trimethylpentane in a mixture of 2,2,4-trimethylpentane and heptane that has equivalent knock properties. For the given question, Octane number =

$$\frac{\text{Amount of 2,2,4-trimethylpentane}}{\text{Amount of mixture}} \times 100$$

$$= \frac{60 \text{ g}}{(60 + 40) \text{ g}} \times 100 = 60$$

Ans. B

**SUMMARY OF ANSWERS
[CHEMISTRY 2013/2014]**

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

BONUS TIP

Endeavor to read through the *Admission Success Tips* in this book. Read from the first one through to the last one. You may find out that you need to make one or two adjustments in certain areas to reposition yourself for a successful admission search.

**CHEMISTRY 2014/2015 QUESTIONS
[MORNING]**

1. A mixture of sand, ammonium chloride and sodium chloride is best separated by
 - A. sublimation followed by addition of water and filtration
 - B. sublimation followed by addition of water and evaporation
 - C. addition of water followed by filtration and sublimation
 - D. addition of water followed by crystallization and sublimation
2. Which of the following elements is common to bronze and soft solder?
 - A. tin
 - B. lead
 - C. copper
 - D. zinc
3. A solution of calcium bromide contains 20g/dm³. What is the molar concentration of calcium bromide relative to bromide ions? [Ca = 40, Br = 80]
 - A. 0.1, 0.1
 - B. 0.1, 0.2
 - C. 0.1, 0.05
 - D. 0.05, 0.1
4. Haze is an example of
 - A. colloid
 - B. suspension
 - C. emulsion
 - D. aerosol
5. The volume of 0.20 mol dm⁻³ H₂SO₄ that will exactly neutralize 25 cm³ of 0.05 mol dm⁻³ KOH solution is
 - A. 3.1 cm³
 - B. 10.4 cm³
 - C. 15.6 cm³
 - D. 26.2 cm³
6. If the relative rate of diffusion of a gas is 0.25 and that of Cl₂ under the same condition is 0.20, calculate the relative molecular mass of the gas.
 - A. 22.7
 - B. 45.4
 - C. 68.1
 - D. 90.8
7. The oxidation states of Chlorine in HOCl, HClO₃, HClO₄, respectively are
 - A. -1, +5 and +7
 - B. -1, -5 and +7
 - C. +1, +3 and +4
 - D. +1, +5 and +7

8. What is the sign of ΔH and ΔS in the following reaction?



$$\Delta H \quad \Delta S$$

- A. + 0
- B. - +
- C. + -
- D. - 0

9. In the periodic table, what is the property that decreases along the period and increases down the group?

- A. atomic number
- B. electron affinity
- C. ionization potential
- D. atomic radius

10. Rusting of iron is a

- A. Redox reaction
- B. Decomposition reaction
- C. Catalytic reaction
- D. Reversible reaction

SUCCESS QUOTE

"You need to really focus on this admission you desire to gain and be realistic about your strategies for success. There are really no shortcuts. You have to give up most of your unprofitable activities and work hard to get admitted."

~ Henry Divine

CHEMISTRY 2014/15 ANSWERS (MORNING)

1. Ammonium chloride sublime and can be separated from the mixture of salt and sand by the process of sublimation. Salt is then separated from sand by dissolving in water and filtering. Ans. A

2. Bronze is an alloy of copper and tin. Soft solder is an alloy of lead and tin. Ans. A

3. Molar mass of $CaBr_2 = 40 + (80 \times 2) = 200\text{g/mol}$

$$\text{Molar Conc.} = \frac{\text{concentration}}{\text{molar mass}} = \frac{20 \text{ g/dm}^3}{200 \text{ g/mol}}$$
$$= 0.1 \text{ mol dm}^{-3} \text{ of } CaBr_2$$



Concentration of $CaBr_2$ is equal to the addition of concentration of Ca^{+2} and Br^- .

If we take the conc. of Ca^{+2} and Br^- to be x resp., then $0.1 = x + x = 2x$

$$\text{Therefore, } x = \frac{0.1}{2} = 0.05 \quad \text{Ans. C}$$

4. A suspension is a heterogenous mixture of undissolved particles in a given medium. The particles are usually large enough to be seen without the aid of an instrument, and they eventually settle down if left standing. Examples of suspension are harmattan haze and paints. Ans. B

5. The neutralization reaction:



$$\text{For neutralization reactions, } \frac{C_A V_A}{C_B V_B} = \frac{N_A}{N_B}$$

$$C_A = 0.20 \text{ mol dm}^{-3} H_2SO_4, V_A = ?, N_A = 1.$$

$$C_B = 0.05 \text{ mol dm}^{-3} KOH, V_B = 25\text{cm}^3, N_B = 2.$$

$$\therefore \frac{0.20 \times V_A}{0.05 \times 25} = \frac{1}{2}$$

$$V_A = \frac{1 \times 0.05 \times 25}{2 \times 0.20} = 3.125 \text{ cm}^3 \quad \text{Ans. A}$$

6. Ans. D (For detailed solution, go to question no 5 of year 2010/11 day 2.)

7. Let the oxidation state of Chlorine be represented by x.

For in HOCl , $+1 - 2 + x = 0$; $x = +1$

For HClO_2 , $+1 + x + 2(-3) = 0$; $x = +5$

For HClO_4 , $+1 + x + 2(-4) = 0$; $x = +7$

Ans. D

8. Note the following:

- $\Delta H = +ve$ for endothermic reactions.
- $\Delta H = -ve$ for exothermic reactions.
- $\Delta S = +ve$ (increase in entropy) if the number of gaseous products exceed that of gaseous reactants.
- $\Delta S = -ve$ (decrease in entropy) if there are more moles of gaseous reactants than gaseous products.
- $\Delta S = 0$ (no change in entropy) if there are equal moles of gaseous reactants and gaseous products.

Ans. D

9. Ans. D (For detailed explanation, go to question no 5 of year 2011/12, day 2.)

10. Rusting is a familiar everyday example of a redox reaction. Rust is the flaky brown substance that forms on iron objects left exposed to the elements for too long, especially if the objects get wet. Rust doesn't just form on the iron object, the iron actually turns into rust (rust is actually a form of oxidized iron).



Ans. A

SUMMARY OF ANSWERS

[CHEMISTRY 2014/2015 (MORNING)]

1.D
6.D

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

DON'T FORGET

The SureSuccess Project is a Divine Project. Don't pirate or use any pirated form of this book. If you do, your own sweat, efforts and aspirations will be frustrated.

CHEMISTRY 2014/2015 QUESTIONS [AFTERNOON]

- SURE SUCCESS IN UNN POST-UTME & DIRECT ENTRY SCREENING EXAMINATIONS by Henry Divine. Tel: 08060848179
1. Hydration of ions in solution is associated with
 - A. absorption of heat
 - B. reduction of heat
 - C. conduction of heat
 - D. liberation of heat
 2. A current was passed for 10mins 20secs and 0.1 mole of Cu was deposited. How many grams of silver will be deposited by the same quantity of electricity? ($\text{Ag}=108$)
 - A. 10.8 g
 - B. 21.6 g
 - C. 5.4 g
 - D. 108 g
 3. What is the pH of 0.001mol dm^{-3} of H_2SO_4 ?
 - A. 3
 - B. 2.7
 - C. 2
 - D. 4
 4. If a reaction is exothermic and there is a great disorder, it means
 - A. the reaction is in a state of equilibrium
 - B. there will be a large decrease in free energy
 - C. there will be a large increase in free energy
 - D. the reaction is static
 5. The gasification of coke is used for the manufacture of
 - A. natural gas
 - B. producer gas
 - C. synthetic gas
 - D. industrial gas
 6. Which of the following is arranged in order of increasing atomic radius?
 - A. Cl, P, Al, Mg, Na, Si
 - B. Na, Mg, Al, Si, P, Cl
 - C. Cl, P, Si, Al, Mg, Na
 - D. Na, Al, Si, Mg, P, Cl
 7. Calculate the molecular formula of a hydrocarbon with molar mass 26 and 92.3% of Carbon.
 - A. C_2H_2
 - B. C_3H_8
 - C. C_2H_6
 - D. C_2H_4
 8. Which of these can be used in removing oil stains?
 - A. Benzene.
 - B. Chlorine water
 - C. Washing soda/soda ash
 - D. potassium trioxonitrate V

9. The position of equilibrium in a reversible reaction is affected by

- A. surface area of the reactants exposed
- B. presence of catalyst
- C. changes in size of reaction flask
- D. changes in concentration of the reaction

10. Which of the following solutions containing only hydroxyl ions will liberate hydrogen gas when reacted with magnesium metal?

- A. 1.0×10^{-2} mol dm⁻³
- B. 1.0×10^{-4} mol dm⁻³
- C. 1.0×10^{-6} mol dm⁻³
- D. 1.0×10^{-8} mol dm⁻³

SUCCESS QUOTE

"It is your *Attitude* more than your *Aptitude* that determines your *Altitude*."

~ Brian Tracy

CHEMISTRY 2014/2015 ANSWERS [AFTERNOON]

1. When an ionic solid dissolves in water, a two-step process occurs, where each step is accompanied by heat change. The steps are:

- a.) The water molecules split up the ions in the crystal into free ions. The process needs energy known as *lattice energy*.
- b.) The free ions are then hydrated by water molecules. This process evolves or liberates energy known as *hydration energy*. Ans. D

2. 1 mole = 1Farad × valency (where 1Farad=96500 C)

$$1 \text{ mole of Cu} = 96500 \times 2 = 193,000 \text{ C}$$

$$0.1 \text{ mole of Cu} = 193,000 \times 0.1 = 19,300 \text{ C}$$

But 1 mole of Ag = 108 g

$$\rightarrow 108 \text{ g of Ag} = 96500 \times 1 = 96500 \text{ C}$$

Therefore, since

$$96500 \text{ C} = 108 \text{ g of Ag}$$

$$19300 \text{ C} = 108 \times 19300 = 21.6 \text{ g of Ag}$$

96500

Ans. B

3. The pH of an aqueous solution is its hydrogen ion concentration expressed mathematically as $\text{pH} = -\log [\text{H}^+]$. For 0.001mol dm⁻³ of H₂SO₄, $\text{pH} = -\log [0.001] = 3$ Ans. A

4. Ans. B

5. Gasification is the process that converts organic or fossil fuel based carbonaceous materials into CO, H₂ and CO₂. This is achieved by reacting the material with a controlled amount of *air* and/or *steam*. The resulting gas mixture is called syngas or synthetic gas.

Note that when air is used, *producer gas* is formed whereas *water gas* is formed when steam is used. Both producer gas and water gas are referred to as synthetic gas. Ans. C

Compare with Question No 11 of year 2007/2008 and Question No 12 of year 2012/2013.

6. The elements under consideration are all found in Period 3 of the periodic table. There is a decrease in atomic radius as the atomic number increases across a period. Ans. C

7. Molar mass of hydrocarbon = 26.

Percentage of carbon = 92.3%

Percentage of hydrogen = (100 - 92.3)% = 7.7%

	C	H
% of elements	92.3	7.7
Mass (in g)	92.3	7.7
Moles	<u>92.3</u>	<u>7.7</u>
	12	1
	7.69	7.7

Mole ratio 1 1

∴ The empirical formula of the compound is CH.

But (Emp formula)_n = Molecular formula

$$(CH)_n = 26; (12 + 1)n = 26 \text{ or } n = 2$$

$$\therefore (\text{CH})_2 = \text{C}_2\text{H}_2 \quad \text{Ans. A}$$

8. Note that oil (fats, paints and wax) are organic

compounds or solutes and it is organic solvents that are suitable for dissolving them. Stains of organic compounds such as grease or oil on fabric are removed by applying any suitable organic solvent such as benzene, diethylether and alcohol. **Ans. A**

9. In an equilibrium mixture, there is a balance between the concentration of the reactants and the products. If the concentration of the reactant is increased, the balance will be upset and the equilibrium position will shift to the right, favoring the forward reaction. **Ans. D**

10. Note that one of the chemical properties of acids is that they react with metals like Zn, Fe and Mg to liberate hydrogen gas. Using the given concentrations of hydroxyl ions, we calculate the pH of each of the solutions as shown below for the 1.0×10^{-12} mol dm⁻³ solution.

$$[\text{OH}] = 1.0 \times 10^{-12} \text{ mol dm}^{-3}$$

$$\text{POH} = -\log_{10}[\text{OH}] \\ = -\log_{10}[1.0 \times 10^{-12}] = 12$$

$$\text{But PH} + \text{POH} = 14$$

$$\text{PH} + 12 = 14$$

$$\text{PH} = 14 - 12 = 2$$

This implies that the solution is highly acidic. Hence will react with Mg to liberate hydrogen gas. **Ans. A**

Compare with year 2010/11, Question No 7.

SUMMARY OF ANSWERS [CHEMISTRY 2014/2015 (AFTERNOON)]

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

SUCCESS QUOTE

"Eventually, people will always pay you for what you know and you will always pay for what you don't know. Your learning power is your earning power. Grab the opportunity to set the right foundation for learning now!"

~ Fela Durotoye

BONUS TIPS

¶ **Deliquescence** is a process by which a substance absorbs water from the atmosphere until it dissolves in the absorbed water and forms an aqueous solution.

¶ A **hydrophilic** substance is one that has the tendency to interact with or be dissolved by water and other polar substances.

¶ **Efflorescence** is the loss of water of crystallization from a hydrated salt to the atmosphere on exposure to air.

¶ **Hygroscopy** is the ability of a substance to attract and hold water molecules from the surrounding environment. This is achieved through absorption or adsorption with the absorbing or adsorbing substance becoming physically changed.

¶ In electrolytic cells, an electric current is used to bring about a chemical reaction whereas in electrochemical cells (such as Daniell cell), a chemical reaction is used to generate electricity. The reaction in question is REDOX.

¶ **Reforming** is the processing technique by which the molecular structure of a hydrocarbon is rearranged to alter its properties. For example, the conversion of open chain alkanes into cycloalkanes and aromatic compounds.

CHEMISTRY 2015/2016 QUESTIONS [I]

Computer Based Test (CBT)



In the reaction above, the concentration of $\text{SO}_{3(g)}$ can be increased by

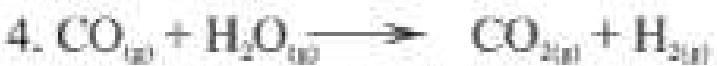
- A. decreasing the pressure
- B. decreasing the temperature
- C. increasing the temperature
- D. the addition of catalyst

2. Which of the following compounds is a normal salt?

- A. Na_2CO_3
- B. NaHSO_4
- C. NaHCO_3
- D. NaHS

3. Which of the following ions can be used as an oxidizing agent?

- A. F^-
- B. Fe^{3+}
- C. Au^{3+}
- D. Ca^{2+}



Calculate the standard heat change of the reaction above if the standard enthalpies of formation of $\text{CO}_{2(g)}$, $\text{H}_2\text{O}_{(l)}$ and $\text{CO}_{(g)}$ in kJ mol^{-1} are -394 , -242 and -110 respectively.

- A. $+262\text{ kJ mol}^{-1}$
- B. -262 kJ mol^{-1}
- C. $+42\text{ kJ mol}^{-1}$
- D. -42 kJ mol^{-1}



In the reaction above, the cyanide is

- A. nucleophilic
- B. electrophilic
- C. hydrophilic
- D. hydrophobic

6. The bleaching action of chlorine gas is effective due to the presence of

- A. oxygen
- B. hydrogen chloride
- C. water
- D. air

7. Which of the following pairs of substances will react further with oxygen to form a higher oxide?

- A. SO_2 and NO
- B. CO_2 and H_2O
- C. CO and CO_2
- D. NO and H_2O

8. The salt formed between citric acid and sodium hydroxide in solution will be

- A. acidic
- B. neutral
- C. basic
- D. amphoteric

9. On exposure to the atmosphere, a hydrated salt loses its water of crystallization to become anhydrous. This phenomenon is referred to as

- A. deliquescent
- B. hygroscopy
- C. hydrolysis
- D. efflorescence

10. Vulcanization involves the removal of

- A. a double bond
- B. the single bond
- C. a polymer
- D. a monomer

11. In an equilibrium reaction, which of the following conditions indicates that maximum yield of product will be obtained?

- A. Equilibrium constant is very large
- B. $\Delta H - T\Delta S = 0$
- C. $\Delta H > T\Delta S$
- D. Equilibrium constant is less than zero



In the reaction above, the mass of carbon(IV) oxide produced by burning 78g of ethyne is

- A. 264g
- B. 39g
- C. 352g
- D. 156g

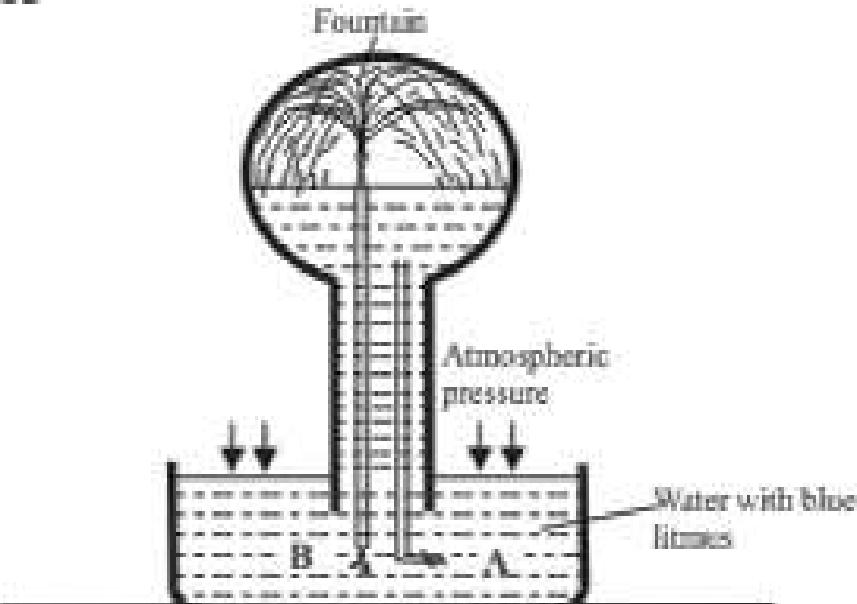
[$\text{C} = 12$, $\text{O} = 16$, $\text{H} = 1$]



In the reaction above, what is the effect of precipitating Cu^{2+} as CuS_s ?

- A. NH_3 concentration will decrease
- B. More NH_3 will be generated
- C. The equilibrium will shift to the right
- D. There will be no effect

Use the diagram below to answer questions 14 and 15



14. Which of the following gases can be used to demonstrate the experiment?

- A. hydrogen chloride
- B. hydrogen sulphide
- C. nitrogen(II) oxide
- D. dinitrogen(I) oxide

15. The colour of the fountain water is

- A. orange
- B. blue
- C. red
- D. yellow

CHEMISTRY 2015/2016 ANSWERS[1]

1. Notice that ΔH is negative. The implication is that the reaction is exothermic. For an exothermic reaction, a decrease in temperature favours the forward reaction. So the concentration of $SO_{3(aq)}$ can be increased by decreasing the temperature. [B]
2. Normal salts are the type of salts formed when all the replaceable hydrogen ions in the acid have been completely replaced by metallic ions. Example Na_2CO_3 . Normal salts are neutral to litmus. [A]
3. An oxidizing agent is a chemical species that removes an electron from another species (i.e. it accepts electron) and becomes reduced. In another sense, an oxidizing agent is a chemical species that transfers electronegative atoms, usually oxygen, to a substrate. Examples include O_2 , MnO_4^- , H_2O_2 , Ag^+ , Ca^{2+} . [D]
4. Recall that standard heat of reaction is the amount of heat evolved or absorbed when a chemical reaction occurs between molar quantities of substances as represented in the equation of reaction under standard conditions.
$$\Delta H(\text{reaction}) = \Delta H_r(\text{products}) - \Delta H_r(\text{reactants})$$
$$\Delta H(\text{reaction}) = -394 - [-242 + (-110)]$$
$$= -394 - [-242 - 110] = -394 - [-352]$$
$$= -394 + 352 = -42 \text{ KJ mol}^{-1} \text{ [D]}$$
5. A nucleophile is a chemical species (an ion or a molecule) that is strongly attracted to a region of positive charge in another species. Nucleophiles donate an electron pair to an electrophile to form a chemical bond in relation to a reaction. All molecules or ions with a free pair of electrons or at least one pi bond can act as nucleophiles. Because nucleophiles donate electrons, they are by definition Lewis bases. Common nucleophiles are hydroxide ions, cyanide ions, water and ammonia. [A]
6. The bleaching action of chlorine is due to its ability to react with water to form oxochlorate(I) acid. The latter is unstable and decomposes to release oxygen which oxidizes dye to form a colourless compound. [C]
7. SO_2 and NO will react further with oxygen to form higher oxides i.e. SO_3 and NO_2 , respectively. [A]

8. Recall that hydrolysis is the reaction of a salt with water to form a solution which is neutral, acidic or basic. Generally, when you dissolve normal salts (salts formed from strong acids and strong bases) in water, you get a neutral solution. On the other hand, salts from strong acids and weak bases hydrolyse in water to form acidic solutions while salts from weak acids and strong bases hydrolyse in water to form basic (or alkaline) solutions. The salt formed between citric acid and sodium hydroxide in solution will be *basic* since citric acid is a weak acid whereas sodium hydroxide is a strong base. [C]
9. [D] For more details, go to the bonus tips immediately before 2015/2016 Questions (1)
10. Vulcanization refers to a specific curing process of rubber involving high heat and *the addition of sulfur* or other equivalent curatives. It is a chemical process in which polymer molecules are linked to other polymer molecules by atomic bridges composed of sulfur atoms or carbon to carbon bonds. The end result is that the springy rubber molecules become *cross-linked* to a greater or lesser extent. This makes the bulk material harder, much more durable and also more resistant to chemical attack. It also makes the surface of the material smoother and prevents it from sticking to metal or plastic chemical catalysts. [A]
11. In an equilibrium mixture both reactants and products coexist. The magnitude of the equilibrium constant, K , indicates the extent to which a reaction will proceed:
If K is a large number, it means that the equilibrium concentration of the products is large. In this case, the reaction as written will proceed to the right (resulting in an increase in the concentration of products). If K is a small number, it means that the equilibrium concentration of the reactants is large. In this case, the reaction as written will proceed to the left (resulting in an increase in the concentration of reactants). [A]
12. $2C_2H_{2(g)} + 5O_{2(g)} \rightarrow 4CO_{2(g)} + 2H_2O_{2(l)}$
2 moles of C_2H_2 → 4 moles of CO_2

$$\text{Mol. mass of } \text{C}_2\text{H}_2 = (12 \times 2) + (1 \times 2) \\ = 24 + 2 = 26$$

$$\therefore \text{mass of 2 moles of } = 2 \times 26 = 52\text{g}$$

$$\text{Mol. mass of } \text{CO}_2 = 12 + (2 \times 16) = 44\text{g}$$

$$\therefore \text{Mass of 4 moles of } = 44 \times 4 = 176\text{g}$$

$$\text{If } 52\text{g of } \text{C}_2\text{H}_2 \rightarrow 176\text{g of } \text{CO}_2,$$

$$78\text{g of } \text{C}_2\text{H}_2 \rightarrow \frac{176\text{g}}{52} \times \frac{78}{1} \text{ of } \text{CO}_2 \\ = 264\text{g of } \text{CO}_2 \quad [\text{A}]$$

13. In an equilibrium mixture, there is a balance between the concentrations of the reactants and the products. If reactants (in this case Cu^{2+}) are removed from the equilibrium system, the balance will be upset. In order to relieve this constraint (i.e. decrease in the conc. of reactants), the equilibrium position will shift to the left, favouring the backward reaction. Thus, the complex $[\text{Cu}(\text{NH}_3)_4]^{2+}$ produces Cu^{2+} and NH_3 , in keeping with *Le Chatelier's principle*. [B]

14. The setup in the question is a type of chemical demonstration called *ammonia fountain*. The experiment consists of introducing water through an inlet to a container filled with ammonia gas. Ammonia dissolves into the water and the pressure in the container drops. As a result more water is forced into the container from another inlet creating a fountain effect. The demonstration introduces concepts like solubility and the gas laws at entry level. A different gas of comparable solubility in water, such as *hydrogen chloride*, can be used instead of ammonia. [A]

15. The hydrogen chloride gas dissolves in the water to form hydrochloric acid. The hydrochloric acid turns the blue litmus solution to red. [C]

CHEMISTRY 2015/2016 QUESTIONS [2]

Computer Based Test (CBT)

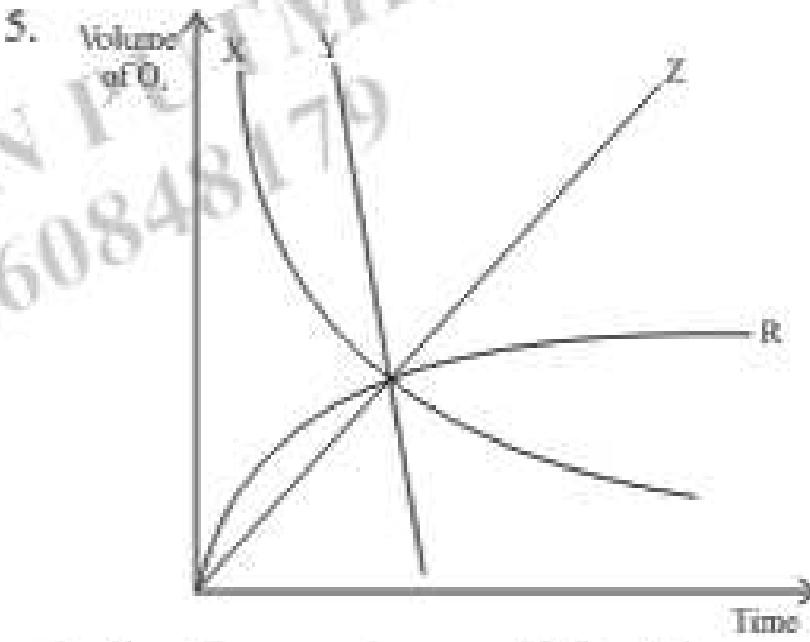
- The basicity of CH_3COOH is

A. 1	B. 2	C. 3	D. 4
------	------	------	------
- Ethanol reacts with conc. tetraoxosulphate(VI) acid at a temperature above 170°C to form

A. ethanone	B. ethanal
C. ethyne	D. ethene
- The type of bonding in iodine molecule is

A. dative	B. covalent
C. coordinate	D. electrovalent
- The acid used in electrolysis of water is

A. HNO_3	B. CH_3COOH
C. H_2SO_4	D. HCl



- In the diagram above, which of the curves represents the evolution of oxygen with time in the equation $2\text{KClO}_{3\text{(s)}} \rightarrow 2\text{KCl}_{\text{(s)}} + 3\text{O}_{2\text{(g)}}?$

- | | | | |
|------|------|------|------|
| A. X | B. Y | C. Z | D. R |
|------|------|------|------|

- In the laboratory preparation of oxygen, dried oxygen is usually it is collected over

A. mercury	B. calcium chloride
C. tetraoxosulphate(VI) acid	D. hydrochloric acid
- The elements that belong to the third period of the periodic table are

A. Li, Be, Al and P	B. Na, P, O and Cl
C. B, C, N and O	D. Na, Mg, S and Ar
- Synthetic gas is a mixture of

A. CH_4 and H_2O	B. CH_4 and H_2
C. CO_2 and H_2	D. CO and H_2
- Which of the following is a neutralization reaction?

SUMMARY OF ANSWERS [CHEMISTRY 2015/2016 (1)]

1.B
6.C
11.A
2.A
7.A
12.A
3.D
8.C
13.B
4.D
9.D
14.A

5.A
10.A
15.C

SUCCESS QUOTE

"Being defeated is often a temporary condition. Giving up is what makes it permanent."

- Marlene van Sonnen

The addition of

- A. nitric acid to hydrochloric acid
- B. nitric acid to distilled water
- C. nitric acid to sodium hydroxide
- D. sodium hydroxide to distilled water

10. A metal X forms two bromides with formulae XBr_2 and XBr_3 . What type of bonding exists between X and bromine in the bromides?

- A. Metallic bonding
- B. Ionic bonding
- C. Covalent bonding
- D. Dative bonding

11. Calculate the mass of 1.12dm^3 of chlorine gas.

- A. 3.55g
- B. 35.5g
- C. 4.5g
- D. 1.78g

12. The sulphide which is insoluble in dilute hydrochloric acid is

- A. ZnS
- B. Na_2S
- C. FeS
- D. CuS

13. What is the pH of a 0.001 mol dm^{-3} solution of sodium hydroxide?

- A. 14
- B. 13
- C. 12
- D. 11

14. The type of isomerism shown by cis- and trans-isomers is

- A. optical isomerism
- B. positional isomerism
- C. functional isomerism
- D. geometrical isomerism

15. Which of the following statements is true about 2-methylpropane and butane?

- A. They have the same boiling points.
- B. They have different number of carbon atoms.
- C. They have the same chemical properties.
- D. They are members of the same homologous series.

SUCCESS QUOTE

"There are no easy methods of learning difficult things; the method is to close your door, give out that you are not at home, and work."

~Joseph de Maistre

CHEMISTRY 2015/2016 ANSWERS [2]

1. The basicity of an acid is the number replaceable hydrogen ions, H^+ , in one molecule of an acid. This implies that not all hydrogen atoms in a molecule of an acid are replaceable by a metal. Only one out of the four hydrogen atoms in ethanoic acid is replaceable by a metal.



Ans. A

2. In the presence of excess conc. tetraoxosulphate(VI) acid at a temperature above 170°C , ethanol reacts to form ethyl hydrogentetraoxosulphate(VI), $\text{C}_2\text{H}_5\text{HSO}_4$, which then decomposes to yield ethene. Ans. D

3. The molecules of iodine are made up of two iodine atoms, held together by a strong *covalent bond*.

Ans. B

4. Note that the electrolysis of water as used in the question means the same thing as the electrolysis of acidified water. Acidified water is made by adding a few drops of tetraoxosulphate(VI) acid to water. The electrolysis of acidified water is the same as the electrolysis of dil. H_2SO_4 . Ans. C

5. In the diagram, the curve that represents the evolution of oxygen with time in the equation $2\text{KClO}_{3(s)} \rightarrow 2\text{KCl}_{(s)} + 3\text{O}_{2(g)}$, is R. Notice that the gradient of the curve is steep at first because the rate of evolution of oxygen is fast. The gradient becomes less steep as the rate of evolution of O_2 slows down (owing to a decrease in the concentration of KClO_3). The curve finally becomes horizontal indicating the end point of the reaction.

Ans. D

6. One of the ways to prepare oxygen in the lab is by the decomposition of potassium trioxochlorate(V). The oxygen liberated is normally collected over water but if it is required dry, it is passed through

conc. H_2SO_4 , and then collected over mercury.

Ans. A

7. Ans. D

8. Synthesis gas (or syngas), is a fuel gas mixture consisting primarily of hydrogen, carbon monoxide, (and very often some carbon dioxide). The name comes from its use as intermediates in creating synthetic natural gas (SNG) and for producing ammonia or methanol. Ans. D

9. A neutralization reaction is when an acid and a base react to form water and a salt. The reaction between nitric acid and sodium hydroxide is a neutralization reaction. Ans. C

10. From the question, we can easily see that X is a polyvalent metal exhibiting the valencies of 2 and 3. The implication of this is that X can give out 2 electrons or 3 electrons in its outermost electron shell in order to bond with bromine. Ionic (or electrovalent) bond is the name given to the type of bond formed when a metal donates electron(s) to a non-metal. Ans. B

11. 1 mole of chlorine = 22.4 dm^3
x mole of chlorine = 1.12 dm^3
 $x = (1.12 \text{ dm}^3 \div 22.4 \text{ dm}^3) \times 1 \text{ mole}$
= 0.05 mole of chlorine

But $n = \frac{\text{mass}}{\text{molar mass}}$

mass = $n \times \text{molar mass} = 0.05 \times (35.5 \times 2)$
= 3.55 g

Ans. A

12. Most sulphides react with hydrochloric acid upon heating to yield hydrogen sulphide. This reaction is used as a test for sulphides. However, sulphides such as CuS , PbS , and HgS are insoluble in hydrochloric acid and must first be fused with sodium trioxocarbonate(IV) before the test is carried out. Ans. D

13. Recall that pH is defined as a logarithmic measure

of hydrogen ion concentration. Mathematically,
 $pH = -\log [H^+]$

$$pH = -\log [0.001] = 3$$

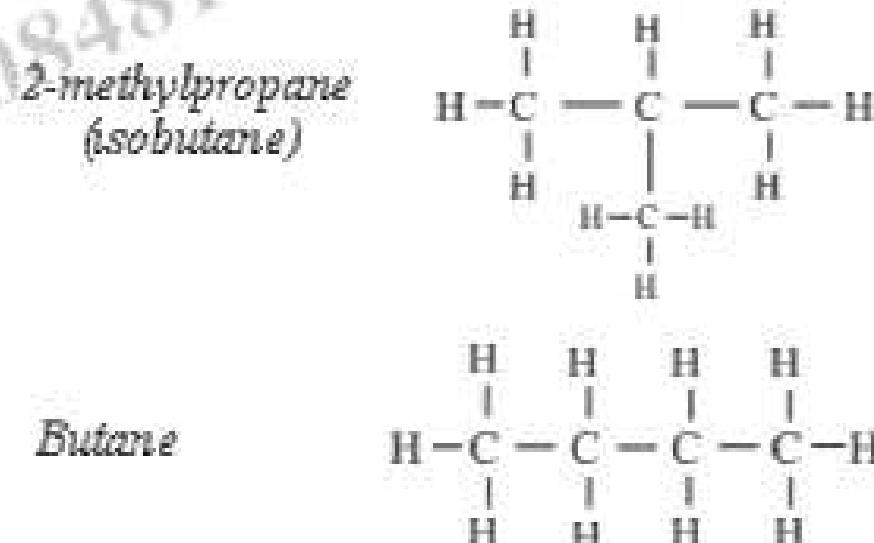
$$\text{But } pH + pOH = 14$$

$$3 + pOH = 14$$

$$pOH = 14 - 3 = 11. \text{ Ans. D}$$

14. Cis/trans isomerism, otherwise referred to as geometric or configurational isomerism, is a term used in organic chemistry to refer to the stereoisomerism engendered in the relative orientation of functional groups within a molecule. Cis and trans isomers occur both in organic molecules and in inorganic coordination complexes. Ans. D

15. For such questions, always draw the structures of the two compounds under comparison. Consider:



The two structures above are different isomers of butane (C_4H_{10}). They have the same number of carbon atoms, different boiling points as a result of their structural differences, and belong to the same homologous series. Ans. D

SUMMARY OF ANSWERS [CHEMISTRY 2015/2016 (2)]

1.A	2.D	3.B	4.C	5.D
6.A	7.D	8.D	9.C	10.B
11.A	12.D	13.D	14.D	15.D

SUCCESS QUOTE

"The difference between the impossible and the possible lies in a person's determination."

~Tommy Lasorda

CHEMISTRY 2017/2018 QUESTIONS [1]

Computer Based Test (CBT)

1. Stainless steel is used for making
A. Tools B. Magnets
C. Coins and medals D. Moving parts of clock
2. The product formed at the cathode during the electrolysis of sodium chloride solution with carbon electrodes is
A. sodium B. chlorine
C. hydrogen D. oxygen
3. The alkanol obtained from the production of soap is
A. ethanol B. glycerol
C. propanol D. glycol
4. Some metals are extracted from their ores after some preliminary treatments by electrolysis (L), some by thermal reaction (T) and some by a combination of both processes (TL). Which set-up in the following for the extraction of iron, copper and aluminium is correct?
A. Iron (L), copper (L), aluminum (T).
B. Iron (T), copper (L), aluminium (T).
C. Iron (TL), copper ((TL), aluminium (TL).
D. Iron (L), copper (T), aluminium (T).
E. Iron (T), copper (L), aluminium (TL).
5. Which of the following will liberate hydrogen from steam or dilute acid?
A. Iron B. Mercury
C. Copper D. Lead
6. The colour of methyl orange in alkaline medium is
A. orange B. red
C. yellow D. pink
7. A compound contains 40.0% carbon, 6.7% hydrogen and 53.3% oxygen. If the molar mass of the compound is 180, find the molecular formula.
A. $C_6H_6O_3$ B. $C_8H_{12}O_6$
C. $C_2H_6O_3$ D. CH_2O
8. Which of these represents a redox reaction?
A. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$,
B. $H_2S + Pb(NO_3)_2 \rightarrow PbS + 2HNO_3$,
C. $CaCO_3 \rightarrow CaO + CO_2$,
D. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
9. The acid that is used to remove rust is
A. boric B. trioxonitrate (V)
C. hydrochloric D. tetraoxosulphate (VI)
10. A compound commonly used for the sterilization and preservation of specimens and food is
A. ethanol B. benzene
C. ether D. ammonia
11. The relative atomic mass of a naturally occurring lithium consisting of 90% Li and 10% Li is
A. 6.9 B. 7.1
C. 6.2 D. 6.8
12. Which of the allotropes of carbon is a constituent of a lead pencil?
A. Graphite B. Diamond
C. Lampblack D. Soot
13. Coffee stains can best be removed by
A. turpentine B. kerosene
C. a solution of borax in water
D. ammonia solution
14. Iron can be prevented from corrosion by coating the surface with
A. gold B. silver
C. zinc D. copper
15. Substances used as drying agents are usually
A. amphoteric B. acidic
C. hygroscopic D. efflorescent

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SUCCESS QUOTE

"If you believe you can, you will."

If you believe you can't,
even the ant will stop you."

~ George Smetsche

CHEMISTRY 2017/2018 ANSWERS[1]

1. Stainless steel is used for making tools because of its hardness, resistance to abrasion and ability to withstand high pressures. **Ans. A**

2. At the cathode, H⁺, being lower in the activity series, discharges in preference to Na⁺:



Hydrogen gas is therefore liberated at cathode.

Ans. C

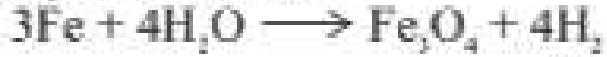
3. Soaps are sodium or potassium salts of long chain fatty acids. When triglycerides in fat/oil react with aqueous NaOH or KOH, they are converted into soap and glycerol. This is called alkaline hydrolysis of esters. Since this reaction leads to the formation of soap, it is called the Saponification process. **Ans. B**

4. Note that the common ores of iron are both iron oxides, and these can be reduced to iron by heating them with carbon in the form of coke. Coke provides both the reducing agent for the reaction and also the heat source.

Aluminium is extracted from bauxite by electrolysis. The extraction process proceeds in two stages. In the first stage, the crude bauxite is purified to yield pure anhydrous aluminium oxide, which is then electrolysed in the second stage.

Ans. E

5. Iron will liberate hydrogen from steam according to the equation below:



Ans. A

6. In an acidic medium, the methyl orange is reddish while it is *yellow in an alkaline medium*.

Ans. C

7. We first determine the empirical formula of the compound:

	C	H	O
% composition:	40	6.7	53.3

No of atoms in each case:	40	6.7	53.3
	12	1	16

$$= 3.3 : 6.7 : 3.3$$

Simple whole number ratio:	3.3	6.7	3.3
	1	2	1

Therefore, empirical formula = CH₂O

The molar mass of the compound = 180

i.e. (CH₂O)_n = 180

$$(12 + 2 + 16)n = 30n = 180$$

$$n = 180 \div 30 = 6$$

$$\text{Hence, } (\text{CH}_2\text{O})_6 = (\text{CH}_2\text{O})_6 = \text{C}_6\text{H}_{12}\text{O}_6$$

Ans. B

8. A redox (oxidation-reduction) reaction is any chemical reaction in which the oxidation number of a molecule, atom, or ion changes by gaining or losing an electron. In other words, it is a type of reaction that involves both a reduction process and a complementary oxidation process. From the options given, an example of a redox reaction is



Zn is oxidized to Zn²⁺

H⁺ is reduced to H₂

Ans. D

9. Note that iron rust is just a hydrated iron (III) oxide (i.e. Fe₂O₃·nH₂O). Tetraoxosulphate (VI) acid is able to remove the elements oxygen and hydrogen in the form of water from compounds such as sugar, etc. This also accounts its use in the removal of rust from iron. **Ans. D**

10. In many experimental procedures, the most effective way to sterilize objects is with ethanol. Either 95% or 70% will work. The latter is actually more effective, but the former is often more convenient. Ethanol is also an excellent preservative which is ideally combined with cold for optimum preserving conditions for keeping specimens for later study. **Ans. A**

11. Normally, the relative abundance of

$$^3\text{Li} = 90\% \quad \text{and} \quad ^7\text{Li} = 10\%$$

We obtain the relative atomic mass as follows

$$\begin{aligned} \text{RAM} &= \left(\frac{90}{100} \times 7 \right) + \left(\frac{10}{100} \times 6 \right) \\ &= 6.3 + 0.6 = 6.9 \end{aligned}$$

Ans. A

12. Allotropy is the existence of an element in two or more different physical forms (usually in the same phase) but with the same chemical properties. Each of the different physical forms is referred to as allotropes. Diamond and graphite

are two allotropic forms of crystalline carbon. Graphite is used in making *lead pencil* when molded into a thin cylinder and encased in wood.

Ans. A

13. Note that in laundries and dry cleaners,
- * fat, oil and grease stains are removed by solvents like petrol, kerosene or ammonia solution.
 - * paint stains are removed by turpentine.
 - * coffee or tea stains are removed by a solution of borax in water. **Ans. C**

14. Electroplating is the process of plating one metal onto another by hydrolysis, most commonly for decorative purposes or to prevent corrosion of a metal. When the purpose of plating is basically to prevent corrosion, manufacturers make use of inexpensive metals such as zinc or steel.

Ans. C

15. Hygroscopic substances are compounds which can attract and hold water molecules from the surrounding environment but not to the extent of turning into solution. Hygroscopic substances are good drying agents. **Ans. C**

SUMMARY OF ANSWERS [CHEMISTRY 2017/2018 (1)]

1.A	2.C	3.B	4.E	5.A
6.C	7.B	8.D	9.D	10.A
11.A	12.A	13.C	14.C	15.C

VERY IMPORTANT

"Be sure of this: The wicked will not go unpunished..." ~ Proverbs 11:21

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CHEMISTRY 2017/2018 QUESTIONS (2)

Computer Based Test (CBT)

1. Which of the following is used to hasten the ripening of fruits?
- A. Ethanol B. Ethene
C. Ethyne D. Ethane
2. The products of the combustion of candle wax are
- A. hydrogen and water
B. oxygen and water
C. carbon(IV) oxide and water
D. carbon(II) oxide and water
3. In the electrolytic extraction of aluminium, the function of the molten cryolite is
- A. precipitate aluminium hydroxide.
B. lower the melting point of aluminium oxide.
C. act as raw material.
D. act as a solvent.
4. A suitable solvent for iodine and naphthalene is
- A. benzene B. ethanol
C. water D. carbon(IV) sulphide
5. What is the IUPAC name of the hydrocarbon
- $\begin{array}{c} \text{CH}_3\text{CH}_2 \\ | \\ \text{CH}_2\text{CH}=\text{C} \\ | \\ \text{CH}_3\text{CH}_2\text{Cl} \end{array}$
- A. 1-chloro-3-ethylpent-3-ene
B. 5-chloro-3-ethylpent-2,3-ene
C. 5-chloro-3-ethylpent-2-ene
D. 1-ethyl-1-chloroethylpropene
6. Which of the following molecules is not linear in shape?
- A. CO₂ B. O₃ C. NH₃ D. HCl
7. Which of the following reactions do alkenes undergo?
- A. Addition reaction
B. Elimination reaction
C. Condensation reaction
D. Substitution reaction
8. Which of the following arrangements is in order of decreasing electropositivity?

- A. Fluorine, Boron, Beryllium, Nitrogen, Lithium
B. Lithium, Beryllium, Boron, Nitrogen, Fluorine
C. Fluorine, Nitrogen, Boron, Beryllium, Lithium
D. Lithium, Nitrogen, Boron, Fluorine, Beryllium
9. How much heat will be liberated if 10g of hydrogen burns in excess oxygen according to the following thermochemical equation?
- $$\text{H}_{2(g)} + \frac{1}{2}\text{O}_{2(g)} \rightarrow \text{H}_2\text{O}_{(l)}; \Delta H^\circ = -286 \text{ kJ}$$
- A. -1430kJ B. -2860kJ
C. -572kJ D. -286kJ
10. What type of bond exist between an element X with atomic number 12 and Y with atomic number 17?
- A. Electrovalent B. Covalent
C. Metallic D. Dative
11. Which of the following is an example of a mixture
- A. Common salt B. Washing soda
C. Sand D. Blood
12. Which of the following is correct of the change in oxidation number of phosphorus from 4P to $2\text{P}_2\text{O}_5$?
- A. 0 to +5 B. 0 to +2
C. 4 to +5 D. 4 to -2
13. Two 50cm^3 cylinders I and II contain hydrogen and oxygen respectively at the same temperature and pressure. If there are 3.0 moles of oxygen, then the mass of hydrogen is
- A. 3g B. 6g C. 9g D. 12g
14. A good method of cleaning up freshly-spilled oil which has not spread over a large surface of water is by
- A. spraying with hot water
B. dispersal with compressed air
C. burning off the oil layer
D. disinfection with chlorine
15. Hardness of water is mainly due to the presence of
- A. calcium hydroxide or magnesium hydroxide
B. calcium trioxocarbonate (IV) or calcium tetraoxosulphate (VI)
C. sodium hydroxide or magnesium hydroxide
D. calcium chloride or sodium chloride salts

CHEMISTRY 2017/2018 ANSWERS[2]

1. Fruit ripening is a coordinated series of biochemical changes that renders the fruit attractive to eat. This process is under genetic regulation, but plant hormones play an essential control. *Ethene* gas acts as a hormone to speed up ripening in bananas and other fruits.
Ans. B
2. A popular type of candle wax used today is paraffin wax, a type of petroleum wax. Paraffin wax's general chemical formula is $\text{C}_n\text{H}_{2n+2}$. It burns in air or oxygen to produce steam, carbon(IV) oxide and a lot of heat.
Ans. C
3. Aluminium ore is called bauxite. The bauxite is purified to yield a white powder, aluminium oxide, from which aluminium can be extracted. The extraction is done by electrolysis. But first the aluminium oxide must be made molten so that electricity can pass through it. Aluminium oxide has a very high melting point (over $2,000^\circ\text{C}$), so it would be expensive to melt it. Instead, it is dissolved in molten cryolite, an aluminium compound with a lower melting point than aluminium oxide. The use of cryolite reduces some of the energy costs involved in extracting aluminium.
Ans. B
4. Note that iodine and naphthalene are both covalent substances and as such, are non-polar. It takes non-polar solvents like *ethanol* to dissolve non-polar substances.
Ans. B
5. In order to obtain the longest continuous chain that contains the $\text{C}=\text{C}$, we redraw the structure:
- $$\begin{array}{ccccccc} \text{CH}_3 & - & \overset{\text{CH}}{\underset{|}{\text{CH}}} & = & \overset{\text{CH}}{\underset{|}{\text{CH}}} & - & \overset{\text{CH}_3}{\underset{|}{\text{CH}}} \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \text{CH}_2\text{CH}_2 & \text{Cl} \end{array}$$
- According to the numbering above, the IUPAC name is 5-chloro-3-ethylpent-2-ene.
Ans. C
6. The ammonia molecule has a trigonal pyramidal shape (three hydrogens at the base and the nitrogen at the top) as predicted by the *valence shell electron pair repulsion theory* with an experimentally determined bond angle of 106.7° .
Ans. C

7. An addition reaction involves the direct addition of an attacking reagent across the double or triple bond of an unsaturated compound to yield a saturated product or at least one in which the degree of saturation is increased. Alkenes undergo addition reactions with hydrogen, halogens, hydrogen halides and many other compounds.

Ans. A

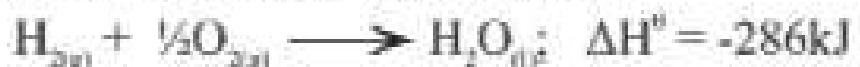
8. Electropositivity is the measure of the ability of elements (mainly metals) to donate electrons to form positive ions. Electropositivity decreases across a period from left to right.

Ans. B

9. $H_2 = (1 \times 2) = 2\text{gmol}^{-1}$.

Therefore, $10\text{g } H_2 = \frac{10\text{g}}{2\text{gmol}^{-1}} = 5 \text{ mol } H_2$

In the thermochemical equation



1 mole of H_2 liberated 286kJ of heat

$$\therefore 5 \text{ mole } H_2 \text{ will liberate } (286 \times 5)\text{kJ of heat} \\ = 1430\text{kJ}$$

Ans. A

10. The element x with atomic number 12 (2, 8, 2) is a metal with a valency of 2. The element y with atomic number 17 (2, 8, 7) is a non-metal with a valency of 1. x and y will combine by transfer of electrons from x to y. This type of bonding is said to be electrovalent. Ans. A

11. A mixture contains two or more constituents which can easily be separated by physical methods. Examples of mixtures include crude oil, blood, sea water, milk, etc. Ans. D

12. Let the oxidation number of phosphorus in $4P$ and $2P_2O_5$, be x and y respectively.

Since the oxidation number of all elements in free state is zero, $x = 0$.

$$2[2(\text{oxidation no of P}) + 5(\text{oxidation no of O})] = 0$$

$$2[2(y) + 5(-2)] = 0; [2y - 10] = 0; 2y = 10$$

$$y = 5. \text{ Ans. A}$$

13. From the question,

$50\text{cm}^3 = V_{H_2} = V_{O_2}$ at constant temperature and pressure.

Therefore,

$$n_{H_2} = n_{O_2} = 3.0 \text{ mol (Avogadro's Law)}$$

$$\text{Molar mass of } H_2 = (1 \times 2) = 2\text{gmol}^{-1}$$

$$\begin{aligned} \text{Mass of } H_2 &= \text{Mole} \times \text{Molar mass} \\ &= 3.0 \text{ mol} \times 2\text{gmol}^{-1} = 6\text{g} \end{aligned}$$

Ans. B

14. A good method of cleaning up freshly-spilled oil which has not spread over a large surface of water is by direct burning. Ans. C

15. Hard water is water that has high mineral content (in contrast with "soft water"). Hard water is formed when water percolates through deposits of limestone, CaCO_3 , or gypsum, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

Ans. B

SUMMARY OF ANSWERS [CHEMISTRY 2017/2018 (2)]

1.B	2.C	3.B	4.B	5.C
6.C	7.A	8.B	9.A	10.A
11.D	12.A	13.B	14.C	15.B

SUCCESS QUOTE

"You want to gain admission into the university to study your dream course, right? Have you thought about thousands of others who also want the same course as you do? Those are your competitors! They are not there to make you afraid or lose hope. Rather, they are there to serve as a constant source of motivation to you; to push you to work as hard as you can."

~ Henry Divine

CHEMISTRY 2018/2019 QUESTIONS

Instruction: There are 17 Questions in this section.

You are expected to answer 15 Questions only.

1. Which of the following ions is isoelectronic with neon? [3Li, 9F, 10Ne, 17Cl, 19K]

- A. Cl⁻ B. F⁻
C. K⁺ D. Li⁺

2. Which of the following gases is employed as an anaesthesia?

- A. NH₃ B. NO
C. N₂O D. NO₂

3. Aluminium is extracted commercially from its ore by

- A. heating aluminium oxide with coke in a furnace
B. the electrolysis of fused aluminium oxide in cryolite
C. treating cryolite with sodium hydroxide solution under pressure
D. heating sodium aluminium silicate to a high temperature

4. The atomic number of Cesium is 55 and its atomic mass is 133. The nucleus of Cesium atom therefore contains

- A. 78 protons and 55 electrons
B. 55 protons and 78 neutrons
C. 55 neutrons and 78 electrons
D. 78 neutrons and 55 neutrons

5. The solubility in moles per dm³ of 20g of CuSO₄ dissolved in 100g of water at 180°C is

- A. 0.13 B. 0.25
C. 1.25 D. 2.00
[Cu = 63.5, S = 32, O = 16]

6. Sodium hydroxide should be stored in properly closed containers because it

- A. readily absorbs water vapour from the air
B. is easily oxidized by atmospheric oxygen
C. turns golden yellow when exposed to light
D. melts at low temperature.

7. $2\text{H}_2\text{S}_{(\text{g})} + \text{SO}_{2(\text{g})} \longrightarrow 3\text{S}_{(\text{s})} + 2\text{H}_2\text{O}_{(\text{l})}$. The above reaction is

- A. a redox reaction in which H₂S is the oxidant and SO₂ is the reductant

B. a redox reaction in which SO₂ is the oxidant and H₂S is the reductant

C. not a redox reaction because there is no oxidant in the reaction equation

D. not a redox reaction because there is no reductant in the reaction equation

8. How many unpaired electrons are in the p-orbitals of a fluorine atom?

- A. 1 B. 2
C. 3 D. 0

9. A metal M displaces zinc from ZnCl₂ solution. This shows that

- A. electrons flow from zinc to M
B. M is more electropositive than zinc
C. M is more electronegative than zinc
D. zinc is more electropositive than M

10. Which of the following relationships between the pressure P, the volume V and the temperature T, represents an ideal gas behaviour?

- A. P \propto VT B. P \propto $\frac{T}{V}$
C. PV \propto $\frac{1}{T}$ D. PT \propto V

11. Increasing the pressure of a gas

- A. lowers the average kinetic energy of the molecules
B. decreases the density of the gas
C. decreases the temperature of the gas
D. increases the density of the gas
E. increases the volume of the gas

12. A quantity of electricity liberates 3.6g of silver from its salt. What mass of aluminium will be liberated from its salt by the same quantity of electricity?

- A. 2.7g B. 1.2g
C. 0.9g D. 0.3g

13. The Avogadro's number of 24g of magnesium is the same as that of

- A. 1g of hydrogen molecules
B. 16g of oxygen molecules
C. 32g of oxygen molecules
D. 35.5g of chlorine molecules

14. Which of the following is arranged in order of increasing electronegativity?

- A. chlorine, aluminium, magnesium, phosphorus, sodium.

B. sodium, magnesium, aluminium, phosphorus, chlorine

C. chlorine, phosphorus, aluminium, magnesium, sodium

D. sodium, chlorine, phosphorus, magnesium, aluminium

15. Fluorine does not occur in the free state in nature because

- A. it is inert
- B. of its high reactivity
- C. it is a poisonous gas
- D. it belongs to the halogen family

16. Which of the following gases has characteristic pungent smell, turns red litmus paper blue and forms dense white fumes with hydrogen chloride gas?

- A. N₂
- B. N₂O
- C. Cl₂
- D. NH₃

17. One of the most commonly determined chemical parameters of water quality is

- A. temperature
- B. suspended solids
- C. Biochemical Oxygen Demand
- D. Turbidity

SUCCESS QUOTE

"History has demonstrated that the most notable winners usually encountered heartbreakingly obstacles before they triumphed. They won because they refused to become discouraged by their defeats."

~ R. C. Forbes

(Founder of Forbes Magazine)

CHEMISTRY 2018/2019 ANSWERS

1. Isoelectronic ions are ions that have the same number of electrons. When a Fluorine atom with 9 electrons acquires an extra electron, it becomes Fluorine ion with 10 electrons just like Neon. [B]

2. An anaesthesia is a chemical substance that has the capacity to induce sleep or render patients insensitive to pains. Examples of such substances include methoxyflurane, chloroform (CHCl₃), and Nitrogen(1) oxide. [C]

3. Aluminium is extracted commercially from its ore by the electrolysis of fused aluminium oxide in cryolite. [B]

4. From the question,
atomic number = 55 = number of protons
atomic mass = 133

But, no of protons + no of neutrons = atomic mass
55 + no of neutrons = 133
no of neutrons = 133 - 55 = 78. [B]

5. 1g of water = 1cm³ = 0.00dm³

$$\text{Mole} = \frac{\text{mass}}{\text{molar mass}}$$

$$20\text{g of CuSO}_4 \text{ contains } \frac{20}{(63.5 + 32 + 64)} \text{ moles}$$
$$= 0.1254 \text{ moles}$$

$$\text{Solubility} = \frac{\text{no of moles}}{\text{volume}} = \frac{0.1254}{0.1}$$
$$= 1.254 \text{ moldm}^{-3} \quad [\text{C}]$$

6. Sodium hydroxide should be stored in properly closed containers because it deliquescent. Deliquescent substances are substances that readily absorbs moisture from the atmosphere until they dissolve in the absorbed water and form a solution. [A]



In the reaction equation, the S in SO₂ reduces from +4 to 0. This implies that SO₂ is the oxidant while H₂S is the reductant. [B]

8. The fluorine atom has an atomic number of 9. The electronic configuration is 1s² 2s² 2p⁵ or 1s² 2s² 2p_x² 2p_y² 2p_z¹. From the above, we see that the p_z-orbital one unpaired electron whereas others contain a pair of electrons each. [A]

9. In the electrochemical series, metals higher up are usually more electropositive than metals below. The metals higher in the activity series would normally displace those lower in the activity series during chemical reactions. If *M* displaces zinc from ZnCl₂, it implies that *M* is more electropositive than zinc. [B]

10. The Ideal Gas Law is derived from Boyle's law, Charles law and Avogadro's law. The three laws, when combined, give PV = nRT.
The Ideal Gas Law is reduced to general gas equation by assuming that n = 1. This gives

$$\frac{PV}{T} = \text{constant} \quad [B]$$

11. According to Boyle's law, pressure is inversely proportional to volume. This means that increasing the pressure of a gas would lead to a decrease in its volume. Since density is inversely proportional to volume, i.e.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$
$$\Rightarrow \text{density} \propto \frac{1}{\text{volume}}$$

as volume decreases, density increases. [D]

12. $\text{Ag}^+ + e^- \rightarrow \text{Ag}$
108g of Ag was liberated by 1 mole of e⁻.
3.6g of Ag will be liberated by $\frac{3.6}{108} = 0.033$ moles



3 moles of e⁻ liberated 27g of Al.

0.033 mole would liberate $\frac{0.033}{3} \times 27\text{ g} = 0.0297\text{ g}$

We can approximate to 0.3g [D]

13. Note that a mole of any substance represents 6.02×10^{23} particles of the substance. This is referred to as the Avogadro's number. Since 24g of magnesium and 32g of oxygen represent 1 mole of the respective elements, they both have the same Avogadro's number. [C]

14. The *electronegativity* of an atom is the power of that atom in a molecule to attract electrons. The electronegativities of elements increase across a period but decrease down a group. The order is sodium, magnesium, aluminium, phosphorus, chlorine. [B]

15. Fluorine does not occur in the free state in nature because of its high reactivity. [B]

16. The characteristics described in the question are those of ammonia gas (NH₃). Ammonia gas is a colourless gas with a characteristic pungent smell. Being alkaline, it turns red litmus paper blue and forms dense white fumes of ammonium chloride with hydrogen chloride gas [D]

17. One of the most commonly determined chemical parameters of water quality is Biochemical Oxygen Demand. *Biochemical Oxygen Demand (BOD)* is the amount of dissolved oxygen used by microorganisms in the biological process of metabolizing organic matter in water. The more organic matter there is, the greater the BOD and the greater the BOD, the lower the amount of dissolved oxygen available for higher animals. BOD is therefore a reliable gauge of the organic pollution of a water body. [C]

SUMMARY OF ANSWERS [CHEMISTRY 2018/2019]

1.B	2.C	3.B	4.B	5.C	6.A
7.B	8.A	9.B	10.B	11.D	12.D
13.C	14.B	15.B	16.D	17.C	

BONUS TIP

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CHEMISTRY 2019/2020 QUESTIONS

Instruction: There are 17 Questions in this section.

You are expected to answer 15 Questions only.

1. Which of the following acts as a reducing and an oxidizing agent?

- A. H₂ B. SO₂
C. H₂S D. C

2. A chloride of sulphur was found to have a relative molecular mass of 135. A 5.4g sample was also found to contain 2.84g of chlorine. What is the molecular formula of the chloride? [Cl=35.5, S = 32]

- A. SCl B. S₂Cl₂
C. S₃Cl₂ D. S₄Cl₆

3. Detergents have the general formula

- A. R(CH₂)_nOH B. RSO₃⁻ Na⁺
C. RCO₂⁻ Na⁺ D. RCO₂H

4. Which of the following on chlorination undergoes substitution at the alkyl group?

- A. Ethers
B. Hydroxyl groups
C. Carbonyl compounds
D. Carboxylic acids

5. Calcium hydroxide is added in the treatment of town water supply to

- A. kill bacteria in the water
B. facilitate coagulation of organic particles
C. facilitate sedimentation
D. improve the taste of the water

6. An iron ore is known to contain 70.0% of Fe₂O₃. The mass of iron metal which can theoretically be obtained from 80kg of the ore is [Fe = 56, O = 16]

- A. 35.0kg B. 39.2kg
C. 70.0kg D. 78.4kg

7. Which of the following is a property of ionic chlorides?

- A. They can be decomposed by heat
B. They react with aqueous AgNO₃ to give a white precipitate which is soluble in excess ammonia
C. They explode when in contact with dry ammonia gas
D. They react with concentrated tetraoxosulphate (VI) acid to give white fumes of chlorine gas



The oxidation number of manganese in the above

reaction changed from

- A. +7 to +2 B. +6 to +2
C. +5 to +2 D. +4 to +2

9. Chlorine, bromine and iodine resemble one another in that they

- A. dissolve in alkalis
B. react violently with hydrogen without heating
C. are liquids
D. displace one another from solutions of their salts

10. Which of the following gases is not associated with global warming?

- A. CO₂ B. SO₂
C. H₂ D. CH₄

11. What will be the reactivity of chlorobenzene in an electrophilic substitution reaction with benzene?

- A. Reacts very slowly than benzene
B. Reacts in the same way as benzene
C. Reacts faster than benzene
D. Does not react with benzene

12. 32g of anhydrous copper(II) tetraoxosulphate(VI) dissolved in 1 dm³ of water generated 13.0kJ of heat. The heat of solution is

- A. 26.0kJ mol⁻¹ B. 65.0kJ mol⁻¹
C. 130.0kJ mol⁻¹ D. 260.0kJ mol⁻¹

[Cu = 64, S = 32, O = 16]

13. Which of the following equations shows that a reaction is in equilibrium?

- A. ΔG = 0 B. ΔG > 0
C. ΔG < 0 D. ΔG = ΔH - TΔS

14. Metals of the first transition series have special properties which are different from those of groups I and II elements because they have partially filled

- A. f orbitals B. d orbitals
C. s orbitals D. p orbitals

15. Calculate the solubility in mol dm⁻³ of 40g of CuSO₄ dissolved in 100g of water at 120°C.

- A. 4.00 B. 2.50
C. 0.40 D. 0.25

16. The removal of rust from iron by treatment with tetraoxosulphate(VI) acid is based on the

- A. hydrolysis of the iron
B. reaction of acid with base
C. oxidation of the rust
D. dehydration of the iron

17. Smoke consists of

- A. solid particles 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

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CHEMISTRY 2019/2020 ANSWERS

1. All the four substances listed in the options – H₂, SO₂, H₂S, C – are good reducing agents. SO₂, in addition to being a reducing agent, has oxidizing properties especially when it is dry. [B]
2. Things to note:
 - a. the mass of sulphur is not given directly, so we are expected to work it out.
 - b. it says that 5.4g of sample contains *2.84g of chlorine*. Since it is a compound of chlorine, we shall assume that the mass refers to chlorine atoms, Cl, rather than molecules, Cl₂. (If the question referred to as mass of chlorine gas, then this would be the mass of chlorine molecules.)

Mass of sulphur in sample = 5.4 – 2.84 = 2.56g

No of moles of sulphur atoms = $\frac{2.56\text{g}}{32\text{gmol}^{-1}} = 0.08\text{mol}$

No of moles of chlorine atoms = $\frac{2.84\text{g}}{35.5\text{gmol}^{-1}} = 0.08\text{mol}$

The ratio is 1 mole of sulphur atoms to 1 mole of chlorine atoms, which gives the empirical formula as SCl.

The molecular formula, S_xCl_y = 135
32 x y + 35.5 x y = 32y + 35.5y = 135
67.5y = 135
y = 135 ÷ 67.5 = 2

Therefore, the molecular formula = S₂Cl₂. [B]
3. Detergent is an emulsifying agent that is formed by the alkaline hydrolysis of “esters” produced by sulphonation of long chain alkenes (e.g. C₁₂H₂₄) or fatty alkanols (e.g. C₁₂H₂₅OH). The equation for the sulphonation of C₁₂H₂₅OH is given below
$$\text{C}_{12}\text{H}_{25}\text{OH} + \text{H}_2\text{SO}_4 \longrightarrow \text{C}_{12}\text{H}_{25}\text{HSO}_4 + \text{H}_2\text{O}$$
When the sulphonation product (i.e. C₁₂H₂₅HSO₄) is hydrolysed with NaOH, it produces detergent.
$$\text{C}_{12}\text{H}_{25}\text{HSO}_4 + \text{NaOH} \longrightarrow \text{C}_{12}\text{H}_{25}\text{SO}_4^-\text{Na}^+ + \text{H}_2\text{O}$$
where C₁₂H₂₅ = R, the general formula is RSO₄⁻Na⁺. [B]
4. In the absence of sunlight, the alpha hydrogen of ethers undergoes substitution when treated with chlorine. [A]
5. Calcium hydroxide is used in the treatment of water that contains temporary hardness [i.e. Ca(HCO₃)₂]. When calcium hydroxide is added to a sample of the water, it precipitates the insoluble calcium trioxocarbonate(IV) which later *settles*. [C]
6. From the question,

mass of iron ore = 80kg

x kg of Fe_2O_3 = 70% of the ore.

$$\text{Therefore, } x = \frac{70}{100} \times \frac{80}{1} = 56\text{kg of } \text{Fe}_2\text{O}_3$$

But,

Molar mass of Fe_2O_3 = $(2 \times 56) + (3 \times 16) = 160\text{g} = 0.16\text{kg}$

Mass of Fe in Fe_2O_3 = $2 \times 56 = 112\text{g} = 0.112\text{kg}$

Therefore, if

$$\begin{aligned} 0.16\text{kg of } \text{Fe}_2\text{O}_3 &\xrightarrow{\text{contains}} 0.112\text{kg of Fe} \\ 56\text{kg of } \text{Fe}_2\text{O}_3 &\xrightarrow{\text{contains}} \frac{56 \times 0.112}{0.16} \\ &= 39.2\text{kg of Fe [B]} \end{aligned}$$

7. [B]

8. On the left hand side, we obtain the oxidation state of manganese (Mn) in MnO_4^- .

If we let the oxidation state of Mn be x , then

$$x + (-8) = -1$$

$$x - 8 = -1$$

$$x = -1 + 8 = +7.$$

On the right hand, the oxidation state of Mn in Mn^{2+} is +2.

Hence, the change is from "+7" to "+2" [A]

9. Chlorine, bromine and iodine are elements that belong to group 7 of the periodic table generally referred to as halogens, having seven electrons in their outer shell. As expected, they resemble one another in both their physical and chemical properties. For example, chlorine and bromine dissolve in cold sodium hydroxide to produce a chloride, and chlorate (I) salt, and bromide and bromate (I) salt respectively; while iodine dissolves in sodium hydroxide to form iodine hydroxide. [A]

10. Global warming is a gradual increase in the overall temperature of the earth's atmosphere generally attributed to the greenhouse effect caused by greenhouse gases. The primary greenhouse gases in the Earth's atmosphere include water vapour (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3).

Note that H_2 is a secondary or indirect greenhouse gas. It reacts with tropospheric OH radicals leading to increased burdens of methane and ozone, and hence to an increase in global warming. [C]

11. The rate of the reaction depends on the electron density in the ring and here in this case, resonance is not favorable and the electronegativity dipole dominates. This slows down the reactivity of chlorobenzene. [A]

12. The mass of 1 mole of CuSO_4 = $64 + 32 + (16 \times 4)$ = 160g.

If 32g of CuSO_4 produced 13.0kJ, 160g of CuSO_4 would produce $\frac{160 \times 13}{32} = 65\text{kJ}$ [B]

13. Free energy is a measure of how much "potential" a reaction has left to do a net work. So if free energy is zero, then the reaction is at equilibrium, and no more work can be done. [A]

14. [B]

15. Note that solubility is defined as the number of moles of a substance that can saturate 1 dm³ of water at a given temperature.

From the question, mass of CuSO_4 = 40g; mass of water = 100g; temperature = 120°C.

Molecular mass of CuSO_4 = $64 + 32 + (16 \times 4)$ = 160g dm⁻³

If 40g of CuSO_4 dissolved in 100g of H_2O , x g of CuSO_4 would dissolve in 1000g of H_2O

where $x = \frac{40 \times 1000}{100} = 400\text{ g of CuSO}_4$

No of moles = $\frac{\text{mass}}{\text{m/mass}} = \frac{400\text{ g}}{160\text{ g mol}^{-1}}$
= 2.5 mol dm⁻³ at 120°C. [B]

16. Rust is an iron oxide, a usually red oxide formed by the redox reaction of iron and oxygen in the presence of water or air moisture. It consists of hydrated iron(III) oxides $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ and iron(III) oxide-hydroxide FeO(OH) which are basic compounds. On reacting with acid, a soluble salt of iron is produced, thus removing the rust. [B]

17. Note that a colloid is a homogeneous non-crystalline substance consisting of large molecules or ultramicroscopic particles of one substance dispersed through a second substance. The particles do not settle, and cannot be separated out by ordinary filtering or centrifuging like those in a suspension. Smoke is a colloid because of the properties it exhibits – uniform and homogeneous mixture that do not separate on its own. It consists of two parts, the particles (solid) and the dispersion medium (gas). [B]

SUMMARY OF ANSWERS [CHEMISTRY 2019/2020]

1.B	2.B	3.B	4.A	5.C	6.B
7.B	8.A	9.A	10.C	11.A	12.B
13.A	14.B	15.B	16.B	17.B	

BIOLOGY

Avoid **WRONG** study environments...



Don't study lying in bed. Your unconscious mind associates your bed with sleep. You are more likely to nod off than get any real study done!

Don't study in front of the television set.

Don't eat while studying. Food can be the greatest distraction of all!

BIOLOGY 2005/06 QUESTIONS

1. The difference between the cell wall of a plant cell and animal cell is that
 - A. plant cell wall contains silica
 - B. animal cell contains stomata in its membrane
 - C. plant cell is made up of membranes only
 - D. plant cell wall contains cellulose
2. In mammals, digestion of starch starts in the
 - A. stomach
 - B. small intestine
 - C. mouth
 - D. liver
3. In the process of pollination of a flowering plant, the pollen grain must touch this structure to start off.
 - A. petals
 - B. calyx
 - C. ovary
 - D. stigma
4. All birds have
 - A. two-chambered heart
 - B. three-chambered heart
 - C. four-chambered heart
 - D. one-chambered heart
5. The list of important types of supporting tissues in plant does not include
 - A. collenchyma
 - B. cambium
 - C. sclerenchyma
 - D. xylem
6. Bones of birds are modified for flight by
 - A. being long
 - B. being cartilaginous
 - C. containing air spaces
 - D. being filled with marrow
7. The waste product of plant like glycosides, tannins, alkaloids and plant oils may be stored in the
 - A. xylem
 - B. cell vacuoles and cell wall of leaves
 - C. roots, stem tissues and bark
 - D. pith, stomata and root hairs
8. The part of the alimentary system of bird where grinding of maize occurs is
 - A. crop
 - B. gizzard
 - C. cloacal
 - D. rectum
9. To study the structure of mammalian kidney in a secondary school you need
 - A. to get fresh kidney of a sheep or a pig
 - B. to get a fresh kidney of a man

- C. to get a fresh kidney of a chick
- D. to get a fresh kidney of a toad
10. The following are some examples of food chain in the savanna terrestrial ecosystem except
 - A. grass → zebra → lion
 - B. diatoms → crayfish → bony fish
 - C. seeds → weaverbird → civets
 - D. leaves → elephant → vulture
11. Reptiles and birds lay eggs on dry land. These are special eggs described as
 - A. ammonic
 - B. amniotic
 - C. embryonic
 - D. chorionic
12. A pollen grain produces two male gametes; one is used to form the zygote while the other forms the endosperm by fusing with
 - A. other pollens
 - B. embryo sac
 - C. polar nuclei
 - D. haploid spore
13. The main vector of malaria parasite is
 - A. culex mosquito
 - B. chrysops
 - C. anopheles mosquito
 - D. aedes mosquito
14. When a plant bearing ripe fruits is swayed by the wind and in the process the seeds are scattered the phenomenon is called
 - A. wind dispersal
 - B. censer mechanism
 - C. winged fruits
 - D. explosive mechanism
15. One of these is not amendment of Mendelian genetics
 - A. multiple alleles
 - B. incomplete dominance
 - C. sex-linked character
 - D. single factor inheritance

SUCCESS QUOTE

“Educating yourself does not mean that you were stupid in the first place; it means that you are intelligent enough to know that there is plenty left to learn.”

—Malorie Joy

BIOLOGY 2005/2006 ANSWERS

1. The difference between the cell wall of a plant cell and animal cell is that plant cell wall contains cellulose. A typical difference between plant cell and animal cell is the presence of cell wall. While the plant cell contains a cellulose cell wall, the animal cell has no cell wall. [D]
2. In mammals, digestion of starch starts in the mouth. Saliva in the mouth contains an enzyme - Ptyalin, which digests starch converting it into complex sugars. [C]
3. In the process of pollination of a flowering plant, the pollen grain must touch the stigmas to start off. The stigma is the structure that receives the pollen grains and it is modified structurally in various ways to carry out that function. [D]
4. All birds have four-chambered hearts. Birds carry out double circulation and have their heart divided into four chambers. Two upper thin-walled auricles and two lower thick-walled ventricles. [C]
5. The list of important types of supporting tissues in plant does not include cambium. The important supporting tissues in plants are: the turgid parenchyma, sclerenchyma, collenchymas and xylem. [B]
6. Bones of birds are modified for flight by containing air spaces. Its skeleton is rigid and the bones have air sacs. Only the vertebrae in the neck are flexible. These features are adaptations for flight. [C]
7. The waste product of plants like glycosides, tannins, alkaloids and plant oils may be stored in the cell vacuoles and cell walls of leaves. [B]
8. The part of the alimentary system of bird where grinding of maize occurs is the gizzard. The gizzard is a strong muscular bag and the action of its muscles and the gastric juice churn and break food into small pieces. [B]
9. To study the structure of mammalian kidney in a secondary school you need to get fresh kidney of a sheep or a goat. [A]
10. Since the savanna is a highly productive habitat, and the herbivores are able to feed on all the available plant food in the grassland; the food chains found include all others except "B". [B]
11. Amniotic egg is the type of egg produced by reptiles, birds, and prototherian (egg-laying) mammals, in which the embryo develops inside an amnion. The shell of the egg is either calcium-based or leathery. [B]
12. Fertilization is a unique process in flowering plants. A pollen grain produces two male gametes. In the embryo sac,
 - ♦ one male gamete fertilizes the egg to form a zygote, and
 - ♦ the other male gamete fuses with another cell (polar nuclei) to form the food storing tissue (endosperm) in the seed.This process is called *double fertilization*. [C]
13. The main vector of malaria parasite is female anopheles mosquitoes. The bites of infected female anopheles mosquito transmit the parasite. Thus, it is the major vector of malaria parasite. [C]
14. Note that dispersal of seeds and fruits is the scattering of seeds and fruits away from the parent plant to avoid overcrowding, thereby reducing competition for food (nutrients), space, water, and air. Agents of dispersal are wind, water, animals and explosive mechanism. The main methods of wind dispersal use 'censer' mechanism, hairs and plumes, winged and light fruits/seeds. In 'censer' mechanism, the seeds are scattered when the plant bearing the ripe fruits sways in the wind. A good example is the capsule of the opium poppy. [B]
15. Though the Mendelian genetics forms the basis for understanding inheritance patterns, several findings do not comply with his inheritance patterns. These findings include: multiple alleles, incomplete dominance, sex-linked characters, co-dominance, linkage, sex determination, polygenic inheritance and mutation. [D]

SUMMARY OF ANSWERS [BIOLOGY 2005/2006]

1.D	2.C	3.D	4.C	5.C
6.C	7.B	8.B	9.A	10.B
11.B	12.C	13.C	14.B	15.D

SUCCESS QUOTE

"Failure will never overtake you if your determination to succeed is strong enough."
~ Og Mandino

BIOLOGY 2006/07 QUESTIONS

1. The mitochondrion consists of
 - A. chemicals that break up complex compounds in the cells into simpler compounds
 - B. rich store of ribonucleic acid
 - C. digestive enzymes and hormones
 - D. protein phosphorus and fats
2. In amoeba, the ectoplasm is bounded by a thin membrane known as the
 - A. plasmasol
 - B. plasmagel
 - C. plasmalemma
 - D. protoplasm
3. Centipedes are
 - A. equally dangerous as millipedes
 - B. less dangerous than millipedes
 - C. more dangerous than all
 - D. not dangerous at all
4. Odontophore is a skeletal structure in the phylum of
 - A. pisces
 - B. echinoderms
 - C. mollusca
 - D. amphibians
5. Wattle is a name of a structure found in
 - A. lizard
 - B. chameleon
 - C. cock
 - D. dogfish
6. One of these is not a feature of the caudal vertebrae in mammal
 - A. they possess neural canal
 - B. their transverse process are poorly developed
 - C. their neural spines are gradually lost
 - D. there are not many articular surfaces
7. The inner ear has two types of coiled structure called cochlea which
 - A. receives sound impulses
 - B. has sensory cell which carry impulses to the spinal cord
 - C. connects to the eusta chain tube
 - D. possess cells sensitive to balance
8. The viruses are the smallest known organisms and are divided into two parts; the outer part and the inner part. The outer part is protein and the inner part is
 - A. nucleus
 - B. vacuole
 - C. particle
 - D. DNA and RNA
9. The thallus of a lichen consists of
 - A. a virus and a fungus

B. algae cells and fungal hyphae
C. bacterial and fungal cells
D. soredium and basisiopod

10. The palisade parenchyma is found in the

- A. steam
- B. leaf
- C. flower
- D. root

11. The tomato fruit is a very good example of

- A. an aggregate fruit
- B. a drupe
- C. a berry
- D. a multiple fruit

12. Crenations occur in the red blood cell when

- A. it is placed in isotonic solution
- B. it is placed in hypertonic solution
- C. osmosis is allowed to occur
- D. transpiration occurs

13. The capillaries act as filters between

- A. the veins
- B. the arteries
- C. the venules
- D. the arteries and the veins

14. The primary openings for gaseous exchange in a plant stem at night are

- A. openings in the cuticles
- B. stomata
- C. lenticels
- D. branches

15. The outer membrane covering the brain is known as

- A. a brain ventricle
- B. a choroid
- C. pia mater
- D. dura mater

SUCCESS QUOTE

"The price of success is hard work, dedication to the job at hand and determination that whether we win or lose we have applied the best of ourselves to the task at hand."

~Vince Lombardi

BIOLOGY 2006/2007 ANSWERS

1. The mitochondrion consists of chemicals that break up complex compounds in the cells into simpler compounds. The mitochondrion which is the power house of the cell is the site of chemical energy conversion for cell activities such as cellular respiration. [A]
2. In amoeba, the ectoplasm is bounded by a thin membrane known as the plasmalemma. The ectoplasm (plasmagel) which is a part of the cytoplasm is bounded by the above membrane. While plasmasol is the name of the other part of the cytoplasm (or endoplasm), protoplasm is that living part of a cell consisting of the cytoplasm and the nucleus. [C]
3. Centipedes are more dangerous. A centipede has poisonous claws found on its segment which it uses to kill prey but a millipede is a harmless animal which feeds on dead decaying matter. [C]
4. Odontophore is a skeletal structure in the phylum of mollusca. It is a structure at the base of the mouth of most mollusks over which the radula is drawn back, and forth in breaking up food. [C]
5. Wattle is a name of a structure found in cock. Wattle is that piece of red skin that hangs down from the throat of a bird. [C]
6. Moving down the vertebral column of a mammal towards the posterior end, transverse processes, articular surfaces, and neural spines all become reduced in size and gradually disappear. [A]
7. The inner ear has two types of coiled structure called cochlea which receives sound impulses. The cochlea which is a spirally coiled tube that looks like a snail's shell contains part of the auditory nerve and on receiving sound impulses, sends them to the brain. [A]
8. The viruses are the smallest known organisms and are divided into two parts; the outer part and the inner part. The outer part is protein and the inner part is DNA and RNA. The virus is the link between living and non-living things. It behaves as both living and non-living organism under different conditions. [D]
9. The lichen is a distinct type of organism in which the thallus (body) is composed of both fungal hyphae (which is a thread-like fungal cells) and algal cells in symbiotic association. The fungal partner is usually an ascomycete and is dominant to the alga which is a green or blue-green alga. [B]
10. The palisade parenchyma is found in the leaf. Parenchyma cells may be modified and more specialized in certain parts of the plant. An example of a tissue that can be regarded as a modified paenchyma is the mesophyll. The mesophyll is the packing tissue found between the two epidermal layers of leaves. And consist of parenchyma modified to carry out photosynthesis. In dicots, there are two distinct layers of mesophyll: palisade mesophyll and spongy mesophyll. [B] [For more, go to Question No. 10 of year 2010/11 (dqv 1)]
11. The tomato fruit is a very good example of a berry. A berry is a type of fleshy fruit which is a true and simple fruit. The epicarp forms a thin membranous skin and the mesocarp and endocarp form a fleshy edible mass within which lie one or more seed(s). [C]
12. Crenation is the contraction of a cell after exposure to a hypertonic solution due to loss of water through osmosis. Crenation occurs because in a hypertonic environment (that is, the cell has a lower concentration of solutes and, therefore, higher water potential than the surrounding extracellular fluid), osmosis (diffusion of water) causes a net movement of water out of the cell, causing the cytoplasm to decrease in its volume. As a result, the cell shrinks and forms abnormal notching around its edges. [B]
13. The capillaries act as filters between the arteries and the veins. Capillaries are microscopic blood vessels that form a network linking the arterioles to venules. [D]
14. The primary openings for gaseous exchange in a plant stem at night are lenticels. Lenticels are primary openings for gaseous exchange on old stems and roots. [C]
15. The outer membrane covering the brain is known as Dura mater. The meninges which envelops the brain and the spinal cord has its outermost membrane Dura mater. [D]

SUMMARY OF ANSWERS [BIOLOGY 2006/2007]

1.A	2.C	3.C	4.C	5.C
6.A	7.A	8.D	9.B	10.B
11.C	12.B	13.D	14.C	15.D

BIOLOGY 2007/08 QUESTIONS

1. Increasing complexity due to multicellularity first appeared in this animal group

- A. protozoa
- B. coelentrata
- C. sarcodina
- D. protista

2. In the angiosperms, the sieve tube members are living non-nucleated, but they are usually accompanied by

- A. cork cambium
- B. phloem rays
- C. vascular cambium
- D. companion cells

3. Abscisic acid is a chemical that prepares plants for

- A. ripening fruits
- B. emergence of seedlings
- C. for leaf fall
- D. reproduction

4. The formula below represents



- A. glycolysis
- B. fermentation
- C. photosynthesis
- D. respiration

5. In any population, any specific allele will mutate at one time or another, usually to a non functional or harmful form. The proportion of gametes carrying new mutant alleles of a given locus is called

- A. the mutation rate
- B. the selection coefficient
- C. the relative fitness
- D. the lethal genotype

6. In mosses, the sporophyte generation is highly prominent producing spores in a cone-like

- A. gametophyte
- B. strobilus
- C. Antheridium
- D. archegonium

7. When Sudan 111 solution is boiled with a solution of food substances, it gives a colour black precipitate showing the presence of

- A. fats and oil
- B. protein
- C. amino acid
- D. starch

8. Plants adapted to life in salty marsh are known as

- A. hydrophytes
- B. xerophytes
- C. halophytes
- D. epiphytes

9. A circulatory system that does not allow mixing of oxygenated blood in the mammalian heart is referred to as

- A. open
- B. double
- C. single
- D. closed

10. In a pyramid of numbers, it is common to have with the smallest of individuals

- A. secondary consumers
- B. tertiary consumers
- C. primary consumers
- D. primary producers

11. In blood transfusion, agglutination occurs when

- A. white blood cells from two people meet
- B. two different antibodies meet
- C. two different antigen meet
- D. contrasting antigens and antibodies meet

12. Genetic counseling is important when marriage is planned between a

- A. Rh⁻ woman and Rh⁻ man
- B. Rh⁻ woman and Rh⁺ man
- C. Rh⁺ man and Rh⁻ woman
- D. Rh⁺ woman and Rh⁺ man

13. One of these animal groups contain acoelomate members

- A. mollusca
- B. coelentrata
- C. arthropoda
- D. reptilian

14. The enzyme invertase will hydrolyse sucrose to give

- A. mannose and galactose
- B. glucose and fructose
- C. maltose and galactose
- D. glycerol and fatty acids

15. A flower that has both stamen and pistil is said to be

- A. perfect
- B. imperfect
- C. pistillate
- D. staminate

SUCCESS QUOTE

"There is one quality that one must possess to win, and that is definiteness of purpose, the knowledge of what one wants and a burning desire to achieve it."

~Napoleon Hill

BIOLOGY 2007/2008 ANSWERS

1. Increasing complexity due to multicellularity first appeared in coelenterata. Coelenterates have specialized cells and tissues and their body is radially symmetrical. [B]
2. Closely associated with each sieve-tube member are one or more companion cells. These come from the same parent cell as the neighboring sieve tube member. [D]
3. Abscission is the process by which a leaf, fruit or any other plant organ falls from the plant naturally. Leaf fall is a typical example of abscission. Before leaf fall occurs, the cells in the leaf begin to die. This dying process is brought about by a fall in auxin level and an accompanying rise in abscisic acid level. [C]
4. In the cells of certain bacteria and plant parts like germinating seeds, glucose ($C_6H_{12}O_6$) is partially broken down to pyruvic acid. This acid is then converted to ethanol (C_2H_5O). Since the end product is an alcohol, the process is known as alcoholic fermentation. [B]
5. The proportion of gametes carrying new mutant alleles of a given locus is called the mutation rate. [A]
6. Archegonium is a multicellular, flask-shaped, female reproductive organ on the prothallium in the higher cryptogams corresponding to a pistil in the flowering plants and containing the egg which becomes the sporophyte. Spores are usually haploid and unicellular and are produced by meiosis in the sporangium by the sporophyte. [D]
7. Sudan III solution is used in the test for fats and oil. When a few drops of Sudan III solution is added to some food substance containing fats or oils, a red coloration is obtained. On boiling, a black precipitate is formed. [A]
8. Halophytes are defined as plants inhabiting areas of high salinity, such as those encountered in estuaries and salt marshes where salinity is constantly changing and may exceed that of sea water. [C]
9. Double circulatory system is the type of circulatory system in which the blood flows through the heart twice. Here, the pulmonary circulation is separate from the systemic circulation. In this circulation, the heart consists of the right side that pumps deoxygenated blood into the pulmonary section and the left side that pumps oxygenated blood into the systemic circulation. [B]

10. In a pyramid of numbers, it is common to have tertiary consumers with the smallest number of individuals. Pyramid of numbers represents the number of individuals at each trophic level of a food chain at a particular time. In most food chains, the producers are numerous, while the final carnivores (tertiary consumers) are few. [B]
11. In blood transfusion, agglutination occurs when contrasting antigens and antibodies meet. The anti-A antibody would cause blood containing red blood cells with antigen A to clump, while anti-B antibody would cause blood containing red blood cell with antigen B to clump. The clumping of red blood cells is called agglutination. [D]
12. Genetic counseling is important when marriage is planned between a rhesus positive man and a rhesus negative woman. For such marriage, the following possibility will result:
 - The child is rhesus negative.
 - The child is rhesus positive.In the former case, there is no issue since the rhesus of both child and mother are alike. There will be no problem during the gestation period. The latter case, however, when the child is rhesus positive, there is a good chance the mother's immune system will begin producing antibodies against the child's red blood cells. [B]
13. The animal group that contains acelomate members is the coelenterates. They are radially symmetrical animals. Note that arthropods and mollusks have a reduced (but still true) coelom. [B]
14. Invertase is an enzyme that catalyzes the hydrolysis (breakdown) of sucrose (table sugar). This gives a mixture of glucose and fructose otherwise referred to as inverted sugar syrup. [B]
15. A flower having sepals, petals, stamens, and pistils is complete; when lacking one or more of such structures, it is said to be incomplete. Stamens and pistils are not present together in all flowers. When both are present, the flower is said to be perfect (or bisexual) regardless of a lack of any other part that renders it incomplete. A flower that lacks stamens is pistillate (or female), while one that lacks pistils is said to be staminate (or male). [A]

SUMMARY OF ANSWERS

[BIOLOGY 2007/2008]

1.B	2.D	3.C	4.B	5.A
6.D	7.A	8.C	9.B	10.B
11.D	12.B	13.B	14.B	15.A

BIOLOGY 2008/2009 QUESTIONS

1. From the following list of types of mutation, identify the one that is hereditary
 - A. genetic mutation
 - B. somatic mutation
 - C. germinal mutation
 - D. gametic mutation
2. Which of these would not be a limiting factor in photosynthesis?
 - A. O₂
 - B. CO₂
 - C. chlorophyll
 - D. light
3. In a cell digestive enzymes mostly occur in
 - A. ribosome
 - B. lysosome
 - C. mitochondria
 - D. plastids
4. Which of these is not a lipid?
 - A. wax
 - B. sterol
 - C. glycerol
 - D. lecithin
5. Phototropism is
 - A. a unilateral response to light
 - B. a bilateral response to light
 - C. both unilateral and bilateral response to light
 - D. a hormonal gradient created within the organ
6. The site of protein synthesis in a cell is
 - A. golgi apparatus
 - B. ribosomes
 - C. lysosomes
 - D. nucleus
7. On storage, the sweetness of corn is lost. This is because
 - A. polysaccharide is reconverted into soluble sugar
 - B. concentration of sugar increases due to storage
 - C. of conversion of sugar to polysaccharide
 - D. enzymes responsible for the conversion are lost
8. The eye worm is known as
 - A. Wuchereiria bancrofti
 - B. Brugia malayi
 - C. Loa loa
 - D. Dracunenlus medinensis
9. Which of these plants is not a pitcher plant?
 - A. nepenthes
 - B. crotalaria
 - C. sarracenia
 - D. dionaea

10. One of these arthropod is a carrier of viruses and other micro organism
 - A. termite
 - B. ant
 - C. bee
 - D. flea
11. The highly developed cortex of the brain of man enables us to do the following except
 - A. think
 - B. reason out
 - C. memorize
 - D. maintain balance of the body
12. Lampbrush chromosome occurs in
 - A. salivary gland
 - B. lymph glands
 - C. cancer cells
 - D. oocytes
13. Insulin is secreted by the
 - A. gall bladder
 - B. pancreas
 - C. liver
 - D. spleen
14. The principal energy storing molecule is
 - A. NADP
 - B. FAD
 - C. ATP
 - D. ADP
15. Each month the uterus lining thickens up in readiness to receive the fertilized egg. If the egg is not fertilized, the lining and some blood is lost through the vagina. This is
 - A. ovulation
 - B. gestation
 - C. fertilization
 - D. menstruation

BONUS TIP

Last year, one of the UNN aspirants who shopped for supplementary admission called me to asked, "Why has UNN decided to steal people's N10,000 in the name of shopping, just like that?" I replied him with the question, "Why did you decide to shop without properly weighing your chances of succeeding?"

To you reading this, if you fail to be admitted on merit, don't take any steps until you have thoroughly read through and understood *Admission Success Tips #3* and other necessary information and guide as would be published on the website www.suresuccess.ng

BIOLOGY 2008/2009 ANSWERS

1. Of the types of mutation [the one occurring in the body cells, i.e. somatic mutation and during gamete (germ cell) formation, i.e. germinal mutation], only the latter is inheritable. [C]
2. Photosynthesis occurs in the chloroplast of green plants containing the green pigment (chlorophyll) in the presence of sunlight using CO₂ and water as raw materials to produce glucose (for energy) and O₂ as waste product. Thus, O₂ would serve as limiting factor if introduced in photosynthesis since it is only a waste product in the process. [A]
3. Lysosomes are small round sacs that contain digestive enzymes that break down structures and substance. [B]
4. The lipids are a large and diverse group of naturally occurring organic compounds that are related by their *solubility in non-polar organic solvents* and generally *insolubility in water*. General names for lipids include: fats and oils, waxes, phospholipids (e.g. Lecithin), steroids (like sterols and cholesterols), and some other related compounds.
Glycerols are obtained from the hydrocarbons by the substitution of three hydroxyl groups for three hydrogen atoms, linked to different carbon atoms. The hydroxyl groups are responsible for the solubility of glycerols in water. [C]
5. Phototropism is the directional growth in which the direction of growth is determined by the direction of light source. In other words, it is the growth response to a light stimulus.
Note that the terms *unilateral* and *diffuse* are used to describe the stimulus while *directional* and *non-directional* are used to describe the response. [A]
6. Ribosomes are small round bodies that are found free in the cytoplasm or attached to the endoplasmic reticulum. They are the sites for protein synthesis. [B]
7. Sweet corn is the result of a naturally occurring recessive mutation in the genes which control conversion of sugar to starch inside the endosperm of the corn kernel. On storage, the sweetness of corn is lost. This is because of the conversion of sugar to polysaccharide, endosperm of the corn kernel. On storage, the sweetness of corn is lost. This is because of the conversion of sugar to polysaccharide. [C]
8. Loa loa is the filarial nematode (round worm) species that causes loa loa filariasis. It is commonly known as the eye worm. [C]
9. Pitcher plants are carnivorous plants whose prey-trapping mechanism features a deep cavity filled with

- liquid known as a pitfall trap. The families *Nepenthaceae* and *Sarraceniaceae* are the best known and the largest groups of pitcher plants. *Dionaea muscipula* (the Venus Flytrap) is also a carnivorous plant that catches and digests animal prey. *Crotalaria* is a genus of herbaceous plants and woody shrubs in the family *Fabaceae* commonly known as *Rattlepods*. It is not a carnivorous plant. [B]
10. The animals that carry pathogenic micro-organisms are known as vectors. Important vectors include insects like houseflies, fleas, cockroaches, mosquitoes and tse-tse flies. [D]
 11. The highly developed cerebral cortex of the brain of man enables us to learn, memorize, reason, etc. Option D has nothing to do with the cerebral cortex. [D]
 12. There are some cells in which chromosomes have an unusual appearance. One example is in the amphibian oocyte (egg mother cell) which has "lampbrush chromosomes," so-called because of their resemblance to brushes which were used to clean the glass of oil lamps. [D]
 13. Insulin is secreted by the pancreas. The liver converts the excess glucose (in the blood) that reaches it after a meal to glycogen. This process is stimulated by the hormone *insulin* which is secreted by the pancreas. [B]
 14. The principal energy storing molecule is ATP (Adenosine Triphosphate). Glucose (the substrate in cellular respiration) and ATP (the final essential end product) are both molecules that act as energy stores. [C]
 15. Each month the uterus lining thickens up in readiness to receive the fertilized egg. If the egg is not fertilized, the lining (and some blood) is lost through the vagina. This is known as menstruation.
Note the following:
 - (A.) Ovulation is the process (in a female's menstrual cycle) by which a mature ovarian follicle ruptures and discharges an ovum (or an egg).
 - (B.) Gestation is the carrying of an embryo or fetus inside a female viviparous animal.
 - (C.) Fertilization is simply the fusion of gametes to produce a new organism. In animals, the process involves the fusion of an ovum with a sperm, which eventually leads to the development of an embryo. [D]

SUMMARY OF ANSWERS [BIOLOGY 2008/2009]

1.C	2.A	3.B	4.C	5.A
6.B	7.C	8.C	9.B	10.D
11.D	12.D	13.B	14.C	15.D

BIOLOGY 2009/2010 QUESTIONS

1. The bryophytes are important parts of certain food chains because they
 - A. grow in great masses
 - B. play a role in the natural aging of lakes and ponds
 - C. they choke up other life forms in the lakes
 - D. they resemble green algae
2. In many plants, the growing tips elongate fastest and are said to be
 - A. meristematic
 - B. apically dominant
 - C. phototropic
 - D. geotropic
3. Movement of water through a semi permeable membrane because the membrane moves or expands thus overcoming the resistance of hydrostatic pressure is referred to as
 - A. diffusion
 - B. osmosis
 - C. osmotic potential
 - D. turgor pressure
4. When the chromosomes condense and the nucleoli and nuclear membrane disappear, the cell is said to be undergoing
 - A. metaphase
 - B. prophase
 - C. anaphase
 - D. telophase
5. While the metabolizing enzymes are inducible other enzymes are said to be
 - A. synthetases
 - B. repressible
 - C. will bind the operator
 - D. will not bind the operator
6. In which of the following organisms does a single cell perform all the functions of movement, nutrition, growth, excretion, and photosynthesis
 - A. paramecium
 - B. euglena
 - C. amoeba
 - D. spirogyra
7. An important abiotic factor that affects plants and animals in their habitats is
 - A. turbidity
 - B. rainfall
 - C. wind direction
 - D. temperature
8. Discontinuous variations is observed in a man using the following
 - A. tongue rolling
 - B. body weight
 - C. height
 - D. skin colour

9. The bone illustrates the structure of
 - A. lumber vertebra
 - B. thoracic vertebra
 - C. caudal vertebra
 - D. cervical vertebra
10. A sex-linked defect that allows small cuts to bleed severely is known as
 - A. anaemia
 - B. anorexia
 - C. haemophilia
 - D. haemolysis
11. In the adult mammalian blood, the cell which lack nuclei are the
 - A. erythrocytes
 - B. lymphocytes
 - C. leucocytes
 - D. phagocytes
12. In which of the following groups of plant fruits is the pericarp inseparable from the seed coat?
 - A. caryopsis
 - B. nut
 - C. follicle
 - D. cypsela
13. The part of the brain that controls body posture in mammals is
 - A. thalamus
 - B. cerebrum
 - C. spinal cord
 - D. cerebellum
14. The ability of an organism to survive in an environment successfully is known as
 - A. residence
 - B. adaptation
 - C. secession
 - D. competition
15. One of the adaptations to life on a tree by a monkey is its possession of digits which are
 - A. long
 - B. opposable
 - C. extensible
 - D. big

SUCCESS QUOTE

“Successful students continually put the pressure on themselves to perform at high levels.
Unsuccessful students have to be instructed, pressured and supervised by others.”

~ Henry Divine

BIOLOGY 2009/2010 ANSWERS

1. Bryophytes include the liverworts and mosses. They grow in great masses in damp places on land. As such, they are very important parts of certain food chains. [A]
2. The root and stem apices of a plant can be divided into the region of cell division, followed by the region of cell elongation and the region of cell maturation. The region of cell division is also known as apical meristem. It consists of meristematic cells (that is, cells capable of active division). [A]
3. Note the Following Definitions:
 - (I.) **Diffusion** is the passive movement of molecules or particles along a concentration gradient, that is, from regions of higher concentration to regions of lower concentration.
 - (II.) **Osmosis** is the diffusion of a solvent (usually water molecules) through a semi-permeable membrane from area of low solute concentration (or higher water potential) to area of high solute concentration (or lower water potential).
 - (III.) **Osmotic potential** is the potential of water molecules to move from a hypotonic solution (more water, less solute) to a hypertonic solution (less water, more solute) across a semi-permeable membrane.
 - (IV.) **Turgor pressure** is the force per unit area exerted outwards on a plant cell wall by the water contained in the cell vacuole.
 - (V.) **Hydrostatic pressure** is the pressure exerted or transmitted by the fluid (eg water) at rest. When the semi-permeable membrane moves or expands, the resistance of hydrostatic pressure drops, leading to a concentration gradient. Thus, water moves across the membrane. This is osmosis. [B]
4. When the chromosomes condense and the nucleoli and nuclear membrane disappear, the cell is said to undergoing prophase. [B]
5. Of the 800 enzymes thought to be synthesized by E.coli, some are synthesized continuously and are called **constitutive enzymes**; others are synthesized only in the presence of an inducer compound and are called **inducible enzymes**. Other enzymes whose production may be suppressed as a result of high concentrations of the culture medium are referred to as **repressible enzymes**. [B]
6. Euglena, a single-celled organism, has both plant and animal characteristics. It has flagella for movement and performs the growth and excretion functions. It has chloroplast for making food and a gullet for taking in food. [B]

7. The living part of an ecosystem is called its biotic component while the non-living part is called its abiotic component. The abiotic component consists of abiotic resources and abiotic conditions. Abiotic factors determine the type of biotic community that is found on a habitat. Some of these factors are important in most habitats, while others are of special importance to a particular habitat such as a terrestrial and an aquatic one. Rainfall, temperature, e.t.c are very important abiotic factors that affect plants and animals in their habitat. But temperature is the most important because a lot of other factors are dependent on it. [D]
8. Discontinuous variation is a type of variation where there are sharp differences between the various forms of a given feature. The ability to roll the tongue is either present in an individual or absent. Therefore, it is a typical example of discontinuous variation. [A]
9. Haemophilia is a recessive disorder in which the afflicted person is unable to clot blood properly leading to profuse bleeding even from small cuts. Several proteins are involved in the clotting process and a mutation of any of the genes controlling the formation of one of these proteins can cause haemophilia. [C]
10. In the adult mammalian blood, the cells which lack nuclei are the erythrocytes. Note that erythrocytes are the red blood cells and a mature (adult) cell does not have a nucleus. [A]
11. Caryopsis is a dry indehiscent fruit in which the pericarp and the seed coat are fused to form a covering over the entire seed. [A]
12. The cerebellum is a part of the hindbrain that controls and co-ordinates body posture and muscular movements, especially those that maintain the body's balance. [D]
13. Generally, organisms show features that enable them to live successfully and reproduce in a particular environment. Those features may be structural, functional or behavioral; and such features are known as adaptations. [B]
14. One of the adaptations of life on a tree by a monkey is its possession of digits which are opposable. Opposable thumbs and big toes on the hands and feet of monkeys are for grasping, leaping and swinging from branch to branch. [B]

SUMMARY OF ANSWERS |BIOLOGY 2009/10|

1.A	2.A	3.B	4.B	5.B
6.B	7.D	8.A	9.	10.C
11.A	12.A	13.D	14.B	15.B

BIOLOGY 2010/11 QUESTIONS

1. Which of the following parts of a cell is living?
 - A. Cell wall
 - B. Calcium oxalate
 - C. Food vacuole
 - D. Mitochondria
2. Cells without an organized nucleus are called
 - A. Heterokaryote
 - B. Eukaryote
 - C. Prokaryote
 - D. Syncaryote
3. The sites for energy transfer within a cell are known as
 - A. Golgi apparatus
 - B. Parenchyma
 - C. Mitochondria
 - D. Nucleolus
4. Food and dissolved oxygen pass from the water directly into the amoeba by a process called
 - A. Transport
 - B. Diffusion
 - C. Fission
 - D. Transpiration
5. Which one of these functions is not performed by the nervous system?
 - A. Receive sensory input from internal and external environment
 - B. Digestion
 - C. Integration
 - D. Response to stimuli
6. In man, gas exchange occurs in the
 - A. Heart
 - B. White blood cells
 - C. Lungs
 - D. Kidney
7. Three chambered heart is found in
 - A. Insects
 - B. Amphibians
 - C. Man
 - D. No animal
8. A plant cell is different from an animal cell because
 - A. The nucleus is pushed to the centre
 - B. The nucleus is small
 - C. The cell wall is made of cellulose
 - D. The cytoplasm fills up the entire cell space
9. In a transverse section of a dicot stem,
 - A. The xylem is more deeply located than the phloem
 - B. The cambium lies between the vascular bundles and the cortex
 - C. The epidermis is completely encircled by the cortex
 - D. The vascular bundles are randomly distributed within the cortex

10. The spongy mesophyll is a tissue found in
 - A. Animal cells
 - B. Plant leaves
 - C. Plant roots
 - D. Plant stem
11. In the nephron, reabsorption of water takes place in the
 - A. Bowman's capsule
 - B. Glomerulus
 - C. Renal tubules
 - D. Selective membranes
12. The mixture of a food substance and Benedict's solution was warmed. The solution changed from blue to brick-red indicating that there is
 - A. Fatty acid
 - B. Sucrose
 - C. Amino acid
 - D. Reducing sugar
13. Sperm cells are produced in the
 - A. Penis
 - B. Bladder
 - C. Testes
 - D. Prostate
14. Photosynthetic pigments are localized in
 - A. Chloroplast
 - B. Stroma
 - C. Stomata
 - D. Thylakoids
15. If a person lives exclusively on a diet of milk, eggs and bread, he is likely to suffer from
 - A. Scurvy
 - B. Rickets
 - C. Beri-beri
 - D. Night blindness

DON'T FORGET
SURE SUCCESS is more than just a book. It's a Divine Project. Don't fall into the temptation of photocopying or preparing with a photocopy of the book. You may be sowing the seed for your frustration in life.

BIOLOGY 2010/2011 ANSWERS

1. The mitochondria is a living part of a cell. It is a sausage-shaped body surrounded by a double-membrane layer. The energy-producing reactions of cellular respiration take place in the mitochondrion and it is often called the “power house” of the cell.
Ans. D
2. Prokaryotes are a group of organisms that lack a cell nucleus, or any other membrane-bound organelles. The organisms that have a cell nucleus are called eukaryotes. **[C]**
3. As noted in *Question 1* above, the mitochondria are sometimes referred to as “cellular power plants” because they generate most of the cell’s supply of adenosine triphosphate (ATP), used as a source of chemical energy. **[C]**
4. Food and dissolved oxygen pass from the water directly into the amoeba by a process called diffusion. Simple unicellular organisms, like the amoeba, carry out material exchanges through their external body surface by diffusion. **[B]**
5. Note that the nervous system is an organ system containing a network of specialized cells called neurons that coordinate the actions of an animal and transmit signals between different parts of its body. The nervous system consists of two parts—central and peripheral. The central nervous system of vertebrates contains the brain, spinal cord, and retina. The peripheral nervous system consists of sensory neurons, clusters of neurons called ganglia, and nerves connecting them to each other and to the central nervous system.
Digestion is not part of the functions performed by the nervous system. **[B]**
6. In humans and mammals, respiratory gas exchange is carried out by mechanisms of the lungs. **[C]**
7. Three chambered heart is found in amphibians. Here the atrium of the heart has a partition dividing it completely into a left chamber and a right chamber. There is no opening connecting the two sides. The ventricle, however, has no partition. **[B]**
8. A plant cell is different from an animal cell because the cell wall is made of cellulose. The

- plant cell contains a few structures not found in animal cells. The most prominent is the cell wall that gives the plant cell its definite shape. It is secreted by the cytoplasm and is composed of cellulose. **[C]**
9. In a transverse section of a dicot stem, the xylem is more deeply located than the phloem. **[A]**
 10. The mesophyll is a tissue between the upper and lower epidermis of a leaf blade (lamina) consisting of parenchyma-like cells containing numerous chloroplast. In many plants, the mesophyll is divided into two distinct layers. The *palisade mesophyll* is usually just below the upper epidermis and is composed of regular layers of elongated cells. Lying below them is the *spongy mesophyll*, composed of loosely arranged cells of irregular shape. This layer contains fewer chloroplasts and has many intercellular spaces (for diffusion of gases), linked to the outside by means of stomata. **[B]**
Compare with year 2006/07, Question No 10
 11. In the nephron, reabsorption of water takes place in the renal tubules. Note that the glomerular filtrate is the fluid that filters into the Bowman's capsule and flows down the tubule. As it passes through the proximal part of the tubule, selective reabsorption of water and other useful substances takes place. **[C]**
 12. When a mixture of a food substance and Benedict's solution is warmed, the initial blue coloration of the mixture turns green, then yellowish and may finally form a brick-red precipitate. This indicates the presence of a reducing sugar. Note that reducing sugars include all monosaccharides such as glucose and fructose, and some disaccharides, such as maltose. **[D]**
 13. In mammals, the testes are often contained within an extension of the abdomen called the scrotum. The primary functions of the testes are to produce sperm (spermatogenesis) and to produce androgens (primarily testosterone). **[C]**
 14. Chloroplasts are specialized organelles found in plants, algae, some protists and other eukaryotic organisms that conduct photosynthesis. The photosynthetic pigments are localized in the chloroplasts and capture the light energy necessary for photosynthesis. **[A]**

15. Note the following:

Scurvy is a disease resulting from a deficiency of ascorbic acid (vitamin C) which is required for the synthesis of collagen in human.

Rickets is a softening of bones in children due to deficiency or impaired metabolism of vitamin D, magnesium, phosphorus or calcium. Note that the predominant cause of rickets is a vitamin D deficiency.

Beri-beri is a nervous system ailment caused by a thiamine deficiency (deficiency of vitamin B₁) in the diet.

Night blindness (nyctalopia) is the inability to see well at night or in a poor light. It is not a disorder in itself but rather a symptom of an underlying disorder or problem e.g untreated myopia, malnutrition (for example, a lack of vitamin A). Note that milk, egg yolk and fortified breads are very good sources of vitamins A, B, and D. [A]

**SUMMARY OF ANSWERS
[BIOLOGY 2010/11]**

1.D	2.C	3.C	4.B	5.B
6.C	7.B	8.C	9.A	10.B
11.C	12.D	13.C	14.A	15.A

BONUS TIP

The Quick Subject Revision Aids in this book are repositories of likely examination questions for UNN post UTME/DE screening. Be wise enough to go through them thoroughly.

BIOLOGY [2011/2012] QUESTIONS

- Iodine turns blue-black on reacting with
 - A. carbon dioxide
 - B. simple sugar
 - C. protein
 - D. starch
- All living things on earth depend on this for their food.
 - A. Moon
 - B. Sun
 - C. Stars
 - D. Stem
- Which is the name of the opening in the human body through which undigested food is thrown out?
 - A. Auditory meatus
 - B. Oral cavity
 - C. Anus
 - D. Nasal cavity
- The scientific name for the human "wind pipe" is
 - A. trachea
 - B. bronchus
 - C. alveoli
 - D. larynx
- The thick-walled blood vessels which carry blood from the heart to all parts of the body are
 - A. veins
 - B. venules
 - C. arteries
 - D. arterioles
- The golgi apparatus serves as the centre of
 - A. fat production
 - B. carbohydrate production
 - C. protein production
 - D. enzyme production
- Plants absorb water from the soil first through the
 - A. stem cell
 - B. root hair
 - C. xylem cells
 - D. leaf cells
- Hygrometer is an instrument used to measure
 - A. wind speed
 - B. wind direction
 - C. oxygen tension
 - D. relative humidity
- The biofuel that can be obtained from cassava or sugar cane is
 - A. methane
 - B. diesel
 - C. kerosine
 - D. ethanol
- An individual of blood group O can be given blood from persons of
 - A. O group only
 - B. Any blood group
 - C. No blood group
 - D. Any blood group except O
- Haemophilia is a condition where there is
 - A. a failure in the clotting of blood

SUCCESS QUOTE

"One of the marks of successful people is that they are action oriented. One of the marks of average people is that they are talk oriented."

- Brian Tracy

BIOLOGY [2011/2012] ANSWERS

1. A boiled starch solution turns blue-black when a few drops of iodine solution are added to it. [D]
 2. All living things on earth depend on the sun for their food. The primary producer traps solar energy and stores it as chemical energy in the food made during photosynthesis. This is later eaten by primary, secondary and tertiary consumers. [B]
 3. Undigested food passes into the colon (large intestine). Here, water is absorbed. This concentrates the waste products and makes them semi-solid. In this state, the waste products are called faeces. Faeces pass into the rectum and out of the body through the anus. [C]
 4. The scientific name for the human windpipe is trachea. The trachea, or windpipe, is a tube that connects the pharynx and larynx to the lungs, allowing the passage of air. [A]
 5. The arteries are blood vessels that carry blood away from the heart to other parts of the body. [C]
 6. The Golgi apparatus, also known as the Golgi complex or Golgi body is an organelle found in most eukaryotic cells. It is particularly important in the processing of proteins (synthesized in the endoplasmic reticulum) for secretion. [C]
Compare with Question No 6 of year 2009/2009.
 7. The function of root hairs is to collect water and mineral nutrients present in the soil and take this solution up through the roots to the rest of the plant. [B]
 8. The hygrometer is an instrument used to measure relative humidity. [D]
Check Biology 151 (Quick Revision Aids) No 120.
 9. A biofuel is a type of fuel whose energy is derived from biological carbon fixation. Bioethanol is an alcohol made by fermentation, mostly from carbohydrates produced in sugar or starch crops such as corn, cassava or sugarcane. Ethanol can be used as a fuel for vehicles in its pure form, but it is usually used as a gasoline additive to increase octane and improve vehicle emissions. [D]
 10. Group O people can donate blood to everyone (universal donors) because their red blood cells do not have antigen A or antigen B, but they can only receive group O blood because their plasma contains both anti-A and anti-B antibodies. [A]
 11. Haemophilia is a condition where there is a delay in the clotting of blood. [B]
For more, go to Question No 10 year 2009/2010.

12. The pancreatic juice contains three important enzymes: Amylopsin, Trypsin and Lipase. *Amylopsin* breaks down starch to maltose. *Trypsin*, a protease, breaks down proteins to polypeptides. *Lipase* breaks down fats to carboxylic acids and glycerol.
N.B: *Erypsin* is the enzyme that changes all polypeptides to amino acids which is the end-products of protein digestion. [C]
13. The *bicuspid valve* is one of the four valves of the heart. It is situated between the *left auricle* and the *left ventricle*. It permits blood to flow one way only, from the left auricle into the left ventricle. This valve is more commonly called the mitral valve because it has two flaps (cusps) and looks like a bishop's miter or headdress. [B]
14. Nephron is the basic structural and functional unit of the kidney. Its chief function is to regulate the concentration of water and soluble substances like sodium salts by filtering the blood, reabsorbing what is needed and excreting the rest as urine. [D]
15. A tropism is a movement of part of a plant in response to, and directed by, an external stimulus. The movement is almost always a growth movement. Tropic responses are described as positive or negative depending on whether growth is towards or away from the stimulus respectively. [B]

**SUMMARY OF ANSWERS
[BIOLOGY 2011/2012]**

- | | | | | |
|------|------|------|------|------|
| 1.D | 2.B | 3.C | 4.A | 5.C |
| 6.C | 7.B | 8.D | 9.D | 10.A |
| 11.B | 12.C | 13.B | 14.D | 15.B |

BONUS TIP

Type of Tropism	Stimulus
Phototropism	Light
Geotropism	Gravity
Chemotropism	Chemical
Hydrotropism	Water
Haptontropism (thigmotropism)	Solid surface or touch
Aerotropism	Air (oxygen)

BIOLOGY [2012/13] QUESTIONS (1)

1. Erythrocytes are produced in the
A. spleen B. liver
C. pancreas D. bone marrow
2. The breaking up of the body of a simple multicellular organism into pieces, each of which grows into a complete new organism is called
A. spore formation
B. budding
C. vegetative reproduction
D. fragmentation
3. When two parents are crossed the offspring are referred to as
A. recessives B. test cross
C. F₁ generation D. F₂ generation
4. Washing cuts and wounds with salt solution can
A. make them salty
B. prevent them from being infected
C. damage them even more
D. be dangerous for the person
5. The vector for Guinea worm is
A. Female Anopheles mosquito
B. Culex mosquito
C. Cyclops
D. Aedes mosquito
6. The most successful group of animals in terms of diversity of species is
A. Mollusca B. Arthropoda
C. Mammalia D. Cnidaria
7. The bone on the neck on which the skull rests is called
A. odontoid process B. axis
C. atlas D. occipital condyle
8. The digestive enzyme that coagulates protein into milk is
A. ptyalin B. pepsin
C. rennin D. trypsin
9. Which of the following animals is cold blooded
A. cat B. whale
C. lizard D. bird

10. The deficiency of Vitamin D leads to
A. Scurvy B. Pellagra
C. Rickets D. Beri beri
11. Which of the following group of characteristics is possessed by all living organisms?
A. growth, feeding, reproduction and respiration
B. birth, irritability, feeding and excretion
C. respiration, excretion, aging and death
D. growth, locomotion, reproduction and excretion
12. Which of these will not be a limiting factor in photosynthesis?
A. O₂ B. CO₂
C. Chlorophyll D. Light
13. Not drinking enough on a hot day and exercise produce
A. a little concentrated urine
B. a lot of dilute urine
C. a lot of sweat at night
D. a lot of concentrated urine
14. In which of the following do the cells have the ability to divide?
A. Meristem B. Sclerenchyma
C. Collenchyma D. Pith
15. Which one of the following pairs is correctly matched?
A. *Enderobius vermicularis* - guinea worm
B. *Loa loa* - eye worm
C. *Dracunculus medinensis* - pin worm
D. *Ancylostoma duodenale* - filarial worm

SUCCESS QUOTE

"Don't just dream of great accomplishments;
stay awake and do them."
-John Muon

BIOLOGY 2012/2013 ANSWERS (1)

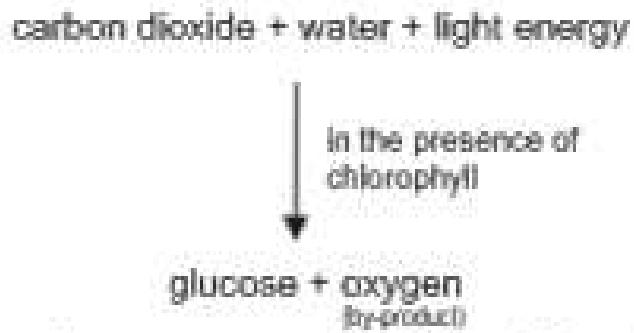
1. Production of erythrocytes (also called red blood cells) is controlled by erythropoietin, a hormone produced primarily by the kidneys. Red blood cells start as immature cells in the bone marrow and after approximately seven days of maturation are released into the bloodstream. [D]
2. The breaking up of the body of a simple multicellular organism into pieces, each of which grows into a complete new organism is called fragmentation. [D]
3. F₁ generation (also called first filial generation) is the generation resulting immediately from a cross of the first set of parents (parental generation). [C]
4. Sodium Chloride, or salt is an "antibacterial agent." Salty water will cause liquids to move out of cells [be that human cells or bacterial] when it comes into contact with them. This process is called osmosis. This movement of water can dehydrate cells, and cause them to die. This process on bacteria kills them and gives salt its antibacterial properties and is the same reason why salt is used to preserve meat. [B]
5. Guinea worm (*Dracunculus medinensis*) is the nematode that causes the guinea worm disease (or *Dracunculiasis*). The nematode infects small copepod crustaceans known as *Cyclops* in water supplies, and human infection consequently occurs with ingestion of water containing the contaminated *Cyclops*. [C]
6. Arthropods are the most biologically successful group of animals because they are the most diverse and live in a greater range of habitats than do the members of any other phylum of animals. The success of arthropods has been attributed to their versatile exoskeleton, their process of metamorphosis, and their metamerized body structure. [B]
7. The atlas is the first cervical (neck) vertebra which is just under the head; it is named after Atlas, the Greek god who supported the world on his shoulders. The axis is the second cervical vertebra; it has what is called the odontoid process about which the atlas rotates. [C]
8. Rennin, also called Chymosin, is a protein-digesting enzyme that coagulates milk by transforming caseinogen into insoluble casein. It is produced in the stomach of young mammals and is essential for the digestion of mother's milk. *Rennin*

enzymes are produced in abundant amount immediately after birth. Its production gradually decreases and is replaced by the digestive enzyme, called *pepsin*. [C]

9. Obviously, cats and birds are warm-blooded animals. Whales like (almost) all mammals are also warm-blooded animals. They belong to the family known as cetacean and actually make up one of the three groups within the cetacean species, the other two being dolphins and porpoises. All three species are marine mammals and share several characteristics with almost all other mammals including: being warm-blooded, having hair, giving birth, breathing oxygen and producing milk (to feed their young). [C]
10. [C] - Rickets. For detailed explanation, go to Question No 15 of year 2010/2011.

11. [A]

12. Consider the chemistry of photosynthesis as given below:



From the above, we see that CO_2 , chlorophyll and light are limiting factors whereas O_2 is only a by-product. [A]

13. Not drinking enough water on a hot day and exercise produce a little concentrated urine as water is lost from the body through sweating. Moreover, the kidneys regulate the amount of water excreted in the urine in order to keep the osmotic pressure of the blood constant. [A]

14. Note that growth in plants is confined to certain regions known as *meristems*. The meristem is a group of cells which retain the ability to divide by mitosis, producing daughter cells which grow and form the rest of the plant body. [A]

15. [B] => Loa loa - eye worm. For detailed explanations, go to Question No 8 of year 2008/09 and Question No 5 of year 2012/13.

SUMMARY OF ANSWERS |BIOLOGY 2012/13|

- | | | | | |
|------|------|------|------|------|
| 1.D | 2.D | 3.C | 4.B | 5.C |
| 6.B | 7.C | 8.C | 9.C | 10.C |
| 11.A | 12.A | 13.A | 14.A | 15.B |

BIOLOGY [2012/13] QUESTIONS (2)

1. The gap between two nerve cells is called
A. dendrite B. synapse
C. axon C. meninge
2. The ovary of a flower develops and becomes a
A. seed B. fruit
C. stalk D. petal
3. The organisms that help in recycling the materials in the ecosystem are known as
A. herbivores B. carnivores
C. omnivores D. decomposers
4. Cellulose is commonly found in
A. animal cell membrane B. plant cell wall
C. both plants and animals D. amoeba
5. The end product of the digestion of fats and oils in mammals are
A. maltose and fatty acids B. amino acids and glucose
C. fatty acids and fructose D. fatty acids and glycerol
6. The oxygen given off during the process of photosynthesis is derived from
A. sunlight B. chlorophyll
C. carbon dioxide D. water
7. In anaerobic respiration, glucose is converted to one of the following
A. carbon(IV) oxide and water B. carbon(IV) oxide only
C. water and acetic acid D. alcohol and water
8. The mushroom is an organism that feeds
A. parasitically B. holozoically
C. symbiotically D. saprophytically
9. Mitochondria are
A. seat of photosynthesis B. seat of enzyme degradation
C. seat of respiration D. seat of photosynthesis

10. Mamu river forest reserve is in
A. Kogi State B. Anambra State
C. River State D. Sokoto State
11. In Igboland, Guinea worm is a common health problem in
A. Ebonyi State only
B. Ebonyi and Imo states
C. Abia State
D. Anambra state
12. Reiter's syndrome is the name given to a form of
A. body odour B. stomach disorder
C. infectious arthritis D. gout
13. Which of these is not a type of soil?
A. sand B. loam
C. granite D. clay
14. Skeletal structures of terrestrial animals are more elaborate than those of aquatic vertebrates because
A. air is more mobile than water
B. water contains more nutrients than air
C. movement is much easier in air than on water
D. density of water is greater than that of air
15. In trying to find out the order in which organisms appear on a cleared plot, you are studying
A. ecosystem B. food chain
C. succession D. food web

SUCCESS QUOTE

"Time slips through our hands like grains of sand, never to return again.
The students who use time wisely are rewarded with the joys of having their dreams come true."

~ Henry Divine

BIOLOGY [2012/2013] ANSWERS (2)

1. The synapse is a junction between two nerve cells, consisting of a minute gap across which impulses pass by diffusion of a neurotransmitter. [B]
2. The ovary is the enlarged bottom part of the pistil. It contains one or more ovoid structures called ovule. Each ovule houses a female gamete. After fertilization, the ovary develops into a fruit, while the ovules develop into seeds which contain the embryo. [B]
3. When plants and animals die, they become food for decomposers like bacteria, fungi and earthworms. Decomposers (or saprotrophs) recycle dead plants and animals into chemical nutrients like carbon and nitrogen that are released back into the soil, air and water. [D]
4. Plants are composed of cells that are enclosed in rigid cell walls made of cellulose, a substance found only in plants. [B]
5. The end products of the digestion of fats and oils in mammals are fatty acids and glycerol. [D]
6. Note that the chloroplast contains the chlorophyll, which absorbs light energy from sunlight. This energy is used for the splitting or photolysis of water to give hydrogen (H) components and hydroxide (OH) components.
$$4\text{H}_2\text{O} \longrightarrow 4\text{H} + 4\text{OH}$$
The OH components undergo further reaction to produce water and oxygen while the H component merely reduces the carbon dioxide to form sugar.
$$4\text{OH} \longrightarrow 2\text{H}_2\text{O} + \text{O}_2$$
Hence, the oxygen liberated comes only from water molecules. [D]
7. Note that respiration is the process by which cells break down sugar. Within a cell, two types of respiration may occur: "aerobic" and "anaerobic." Aerobic respiration is the more productive of the two and requires the presence of oxygen. Without oxygen, anaerobic respiration, which is also known as "fermentation," occurs. The waste product of anaerobic respiration is lactic acid (in animals). In plants, ethanol is the waste product. [D]
8. The mushroom is an organism that feeds saprophytically, i.e. obtains its food from non-living organic matter thereby causing the decay of the organic matter. [D]
9. Mitochondria are seat of respiration. [C]

For more details, go to *Biology 151 (Quick Revision Aid), No 54*.

10. Mamu River forest reserve is in Anambra State. [B]
11. In Igboland, Guinea worm is a common health problem in Abakaliki, Ebonyi State and in Igwun river basin area of Imo State. [B]
12. Reiter's syndrome is a form of arthritis characterized by inflammation of the joints, eyes and genital, urinary or gastrointestinal tract. Reiter's syndrome is also called "reactive arthritis". Some individuals think that it involves the immune system, which is "reacting" to the presence of bacterial infections in the genital, urinary or gastrointestinal systems. [C]
13. [C]
14. The density of water is greater than that of air. As such, water supports the weight of aquatic animals more than air.
Aquatic creatures do not face the problem of having to support their own weight. Those living on land, however, expend 40% of their energy just in moving around. That's why their skeletal structures are more elaborate. [D]
15. Succession is a phenomenon or process by which an ecological community undergoes more or less orderly and predictable changes following disturbance or initial colonization of new habitat. Succession may be initiated either by formation of new, unoccupied habitat (e.g., a lava flow or a severe landslide) or by some form of disturbance (e.g. fire, severe windthrow, logging) of an existing community. Succession that begins in new habitats, uninfluenced by pre-existing communities is called primary succession, whereas succession that follows disruption of a pre-existing community is called secondary succession. [C]

SUMMARY OF ANSWERS [BIOLOGY 2012/2013]

- | | | | | |
|------|------|------|------|------|
| 1.B | 2.B | 3.D | 4.B | 5.D |
| 6.D | 7.D | 8.D | 9.C | 10.B |
| 11.B | 12.C | 13.C | 14.D | 15.C |

SUCCESS QUOTE

"This year is your year. You will wave goodbye to JAMB and Post-UTME. Just believe."

~ Henry Divine

BIOLOGY 2013/2014 QUESTIONS

1. Increasing peristalsis of intestines, increasing starvation, and slowing heart rate are examples of
A. automatic nervous system responses
B. higher brain function
C. parasympathetic nervous system response
D. sympathetic nervous system responses
2. Which of the following tubes conveys sperm from the seminal vesicle to the urethra?
A. ejaculatory duct B. epididymis
C. oviduct D. vas deferens
3. Most carbon dioxide is carried in the
A. blood as CO₂ gas
B. blood bound to hemoglobin
C. blood plasma in the form of carbonic acid
D. red blood cells
4. Lampbrush chromosome occurs in
A. salivary gland B. lymph glands
C. cancer cells D. oocytes
5. A mosquito which produces eggs with float, and whose larvae lie horizontal to the water surface, also rests at an angle on a vertical surface. This mosquito is
A. aedes B. anopheles
C. culex D. tiger mosquito
6. Which of the following parts is involved in both the respiratory and digestive systems?
A. larynx B. nasal cavity
C. pharynx D. trachea
7. Most of the digestion of food and absorption of nutrients occur in the
A. ascending colon B. esophagus
C. small intestine D. stomach
8. Which of the organs listed below has endocrine and exocrine functions?
A. kidney B. liver
C. lung D. pancreas
9. The hypothalamus, thalamus, and pituitary gland are all parts of the
A. brainstem B. cerebellum
C. exocrine system D. limbic system
10. Quill feather in bird is used
A. to generate heat to keep the bird warm
B. to provide some power for flight
C. to prevent ectoparasites from attacking the bird
D. as insulator to maintain body heat

BIOLOGY 2013/2014 ANSWERS

1. The Parasympathetic Nervous System (PNS) is responsible for stimulating digestion by increasing blood flow to the digestive tract. The PNS stimulates salivary gland secretion and increases peristalsis. This increases the digestion of food and absorption of nutrients. [C]
2. Ejaculatory duct is a canal through which semen is ejaculated. In human males, the canal that passes from the seminal vesicle and vas deferens, conveying semen to the urethra. [A]
3. Most carbon dioxide is carried in the red blood cells. [D]
For detailed explanation of this, go to the Bonus Tip immediately after 2014/2015 Questions for Morning Session.
4. [D]
For detailed explanation, go to Question No 12 of Year 2008/2009.
5. Like all flies, mosquitoes go through four stages in their life cycles: egg, larva, pupa, and adult or imago. In most species, adult females lay their eggs in stagnant water; some lay eggs near the water's edge; others attach their eggs to aquatic plants. Each species selects the situation of the water into which it lays its eggs and does so according to its own ecological adaptations. Female anopheles mosquitoes deposit eggs individually on the surface of fresh water streams, ponds, and lakes with aquatic vegetation. The eggs are unique in having floats on either side. The larvae lie horizontally at the surface of the water where they filter feed on organic material. [B]
6. The pharynx, or throat, is the passageway leading from the mouth and nose to the esophagus and larynx. It permits the passage of swallowed solids and liquids into the esophagus, or gullet, and conducts air to and from the trachea, or windpipe, during respiration. The pharynx is, therefore, part of the digestive system as well as the respiratory system. [C]
7. Most digestion and absorption of food occurs in the small intestine. The small intestine is a narrow, twisting tube that occupies most of the lower abdomen between the stomach and the beginning of the large intestine. It extends about

20 feet in length. The small intestine consists of three parts: the duodenum (the C-shaped part), the jejunum (the coiled midsection), and the ileum (the last section). [C]

8. The pancreas is an organ located in the abdomen. It plays an essential role in converting the food we eat into fuel for the body's cells. The pancreas has two main functions: an exocrine function that helps in digestion and an endocrine function that regulates blood sugar. [D]
9. The limbic system is a complex set of structures that lies on both sides of the thalamus, just under the cerebrum. It includes the hypothalamus, the pituitary gland, the hippocampus, the amygdala, and several other nearby areas. [D]
10. Quill feather in bird is used to provide some power for flight. [B]

SUMMARY OF ANSWERS

[BIOLOGY 2013/2014]				
1.C	2.A	3.D	4.D	5.B
6.C	7.C	8.D	9.D	10.B

SUCCESS QUOTE

"Have you ever wondered why many students sleep too much, and wake up to spend the day accomplishing very little?

The reason is because they really do not have the zeal, enthusiasm and inner drive to actualize their dreams. If you genuinely desire to enter school to study your dream course, you must constantly fan the flames of hard work."

~Henry Divine

BIOLOGY 2014/2015 QUESTIONS

[MORNING]

1. Which of these is a sense organ?
A. spleen B. mouth
C. eye D. heart
2. What is the function of the vas deferens in the male reproductive organ?
A. transports sperm only
B. transports urine and sperm
C. transports urine only
D. none of the above
3. Food materials manufactured in plants are transported through the
A. xylem B. phloem
C. cambium D. cortex
4. When a red blood cell is placed in water, the process of water movement is
A. osmosis B. diffusion
C. imbibition D. active transport
5. The enzyme contained in bile is
A. trypsin B. lipase
C. ptyalin D. lactase
6. Which of these factors in the blood is responsible for blood clotting?
A. fibrinogen B. heparin
C. plasma D. red blood cells
7. Fat soluble vitamins are stored in
A. liver B. spleen
C. pancreas D. skin
8. The unit of the nervous system is
A. neuron B. axon
C. dendrite D. myelin sheet
9. Moulting involves the
A. shedding of exoskeleton in insects in order to replace with better ones
B. shedding of exoskeleton in insects in order to grow new ones

- C. shedding of exoskeleton in insects in response to seasonal changes
- D. none of the above

10. Pepsin is a digestive enzyme which breaks
A. sucrose into glucose and fructose
B. carbohydrates into simple sugars
C. protein into peptones
D. fats into glycerol and fatty acids

BONUS TIP

TRANSPORT OF CARBON DIOXIDE

Several properties of carbon dioxide in the blood affect its transport. There are 3 ways in which carbon dioxide is transported in the blood:

(1) DISSOLVED CO₂

- * Carbon dioxide is much more soluble in blood than is oxygen.
- * About 5 to 7 percent of all carbon dioxide is transported unchanged, simply dissolved in the plasma.

(2) BOUND TO HAEMOGLOBIN AND PLASMA PROTEINS

- * Carbon dioxide combines reversibly with haemoglobin to form carbaminohaemoglobin. Carbon dioxide does not bind to iron, as oxygen does, but to amino groups on the polypeptide chains of haemoglobin.
- * Carbon dioxide also binds to amino groups on the polypeptide chains of plasma proteins.
- * About 10 % of carbon dioxide is transported bound to haemoglobin and plasma proteins.

(3) CARRIED AS BICARBONATE IONS

- * The majority of carbon dioxide molecules (85 percent) are carried as part of the bicarbonate buffer system. In this system, carbon dioxide diffuses into the red blood cells in the tissue capillaries where it combines with water to form carbonic acid (H₂CO₃). This reaction is catalysed by the enzyme carbonic anhydrase, which is found in the red blood cells.
- * This reaction also occurs outside the red blood cells, in the plasma, but is much slower due to the lack of carbonic anhydrase.

BIOLOGY 2014/2015 ANSWERS [MORNING]

1. There are five senses in the human body: sight, hearing, taste, smell and touch. There are organs connected with these senses that enable information from the outside world to be received through specific receptors that are connected to the brain by the nerves. The eye is the sense organ of sight. [C]
2. The vas deferens is a straight tube of about 40 cm long which carries sperm to the urethra. Most of the sperm are stored in the vas deferens. [A]
3. [B] - phloem
For detailed explanation, go to Biology 151 (Quick Revision Aid), No 57.
4. Osmosis is the movement of water molecules from an area of high water concentration (weak/dilute solution) to an area of low water concentration (strong/concentrated solution) through a partially permeable membrane. Red blood cells have partially permeable membrane. This means that if they are placed in pure water, because their cytoplasm is a stronger solution than the pure water, water will pass into the cells by osmosis.
[A]
5. The bile is a fluid that is made and released by the liver and stored in the gallbladder. It helps with digestion as it breaks down fats into fatty acids, which can be taken into the body by the digestive tract. Bile contains mostly water, cholesterol, bile acids (also called bile salts), bilirubin (a breakdown product of red blood cells), body salts (potassium and sodium), Copper and other metals. (No correct option)
6. Fibrinogen is a soluble protein present in the blood that is activated by thrombin to form fibrin. Fibrinogen is a clotting factor and is required to prevent major blood loss. [A]

7. Fat-soluble vitamins are vitamins that are soluble in fat solvents and oils. They include vitamins A, D, E, and K. The body stores them in the liver and adipose (fat) tissue when not used. [A]
8. A neuron is a nerve cell that is the basic building block or unit of the nervous system. There are three basic parts of a neuron: the dendrites, the cell body and the axon. [A]
9. Moulting involves the shedding of exoskeleton in insects in order to grow new ones. [B]
10. Pepsin an enzyme, produced in the stomach, that in the presence of hydrochloric acid splits proteins into proteoses and peptones. [C]

SUMMARY OF ANSWERS

[BIOLOGY 2014/2015 (MORNING)]				
1.C	2.A	3.B	4.A	5.
6.A	7.A	8.A	9.B	10.C

SUCCESS QUOTE

"Success is an inevitable reward for hard work."
-Felix Onyejere

BIOLOGY 2014/2015 QUESTIONS [AFTERNOON]

1. The process that involves the production of ethanol, CO₂, and H₂O is called....
A. fermentation B. respiration
C. transpiration D. photosynthesis
2. Genes are located at the
A. chromosome B. Nucleus
C. mitochondria D. ribosome
3. Teleost fish breathes with its
A. fins B. gills
C. scales D. lateral line
4. consists mainly of water in the blood?

- A. lymph B. plasma
C. serum D. platelets

5. Protein in plasma
A. causes clotting of blood
B. causes increase in osmotic potential
C. gives the blood its red colour
D. regulates the acid-base balance of the blood
6. A substance produced by the action of hydrochloric acid on gastric juice in the stomach is
A. trypsin B. rennin
C. pepsin D. lipase
7. The gaps between two neurons through which impulses cross by means of chemical reaction are called
A. axons B. ganglia
C. synapses D. dendrites
8. Spider belongs to the same class with
A. mosquito B. tick
C. chiddae D. cockroach
9. The process by which a plant grows towards the direction of water is...
A. geotropism B. phototropism
C. hydrotropism D. chemotropism
10. When a red blood cell is placed in water, the process of water movement is
A. osmosis B. diffusion
C. imbibition D. active transport

SUCCESS QUOTE

"Always bear in mind that your own resolution to succeed is more important than any other one thing."

~Abraham Lincoln

BIOLOGY 2014/2015 ANSWERS [AFTERNOON]

1. Ethanol is commercially produced using a process called fermentation. Fermentation is the process in which yeast breaks down sugar into alcohol and carbon dioxide. Yeast are tiny single-celled fungi that contain special enzymes responsible for this reaction.
The word equation for this process is:
 $\text{Glucose} + \text{yeast} \longrightarrow \text{alcohol} + \text{carbon dioxide}$
Carbon dioxide gas bubbles out of the fermenting solution into the air leaving a mixture of ethanol and water. [A]
2. Gene is a hereditary unit consisting of a sequence of DNA that occupies a specific location on a chromosome and determines a particular characteristic in an organism. [A]
3. There are two main groups of fish, bony fish (*Teleosts*) and cartilaginous fish (*Elasmobranchs*). As the common names imply, the skeletons of teleosts are made of bone while the elasmobranchs have cartilaginous skeletons. The elasmobranchs comprise sharks, rays and dogfish which differ from teleosts in many respects. The teleosts are far more numerous, with a greater diversity of species than the elasmobranchs. All fish are aquatic and breathe by absorbing dissolved oxygen in the water using their gills. [B]
4. The main components of blood include plasma, red blood cells, white blood cells and platelets. Plasma is the liquid component of the blood, in which the red blood cells, white blood cells, and platelets are suspended. It constitutes more than half of the blood's volume and consists mostly of water that contains dissolved salts (electrolytes) and proteins. [B]
5. The most important plasma proteins are fibrinogen, albumen and globulin. Fibrinogen plays an important role in the clotting of blood. Albumen and globulin regulate the water content

of cells and extracellular body fluids. Globulin also gives rise to antibodies that provide immunity against various diseases. [A]

6. Gastric Juice is a mixture of chemicals, one of which is pepsin. Pepsin is an enzyme that breaks down proteins to peptides. It is actually secreted as pepsinogen by the chief cells of the gastric glands. However, once pepsinogen encounters an acidic environment (hydrochloric acid), it changes shape into its active form called pepsin. [C]

7. Ans. C. For more explanation, go to Question No 1 of year 2012/2013.

8. Note that spiders belong to the class Arachnida. Other arachnids include scorpions, ticks, mites and harvestmen.

Many arachnids are thought of as insects, especially ticks, but they are not. All arachnids have four pairs of legs as adults and have no antennae or wings. Adult insects have three pairs of legs, one pair of antennae and wings. [B]

9. The process by which a plant grows towards the direction of water is hydrotropism. [C]

Compare with Question No 15 of year 2011/2012. For more on this, go to the Bonus Tip at the end of Answers to 2011/2012 Questions.

10. Osmosis is the movement of water molecules from an area of high water concentration (weak/dilute solution) to an area of low water concentration (strong/concentrated solution) through a partially permeable membrane. Red blood cells have partially permeable membrane. This means that if they are placed in pure water, because their cytoplasm is a stronger solution than the pure water, water will pass into the cells by osmosis. [A]

SUMMARY OF ANSWERS

[BIOLOGY 2014/2015 (AFTERNOON)]

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

BIOLOGY 2015/2016 QUESTIONS [I]

Computer Based Test (CBT)

1. The part of the mammalian brain responsible for maintaining balance is
 - A. medulla oblongata
 - B. cerebellum
 - C. optic lobe
 - D. cerebrum
 - E. olfactory lobe
2. Milk can be pasteurized by
 - A. addition of common salt
 - B. boiling for one hour
 - C. heating to 75°C for 20 minutes
 - D. the addition of vinegar
 - E. heating to 100°C for 12 hours
3. Water is required for seed germination to take place because it
 - A. activates the enzymes
 - B. softens the testa
 - C. liberates energy for growth
 - D. permits radicle growth
 - E. allows oxygen to diffuse into the seed
4. If an organic compound has its hydrogen:oxygen ratio as 2:1, it is likely to be
 - A. a protein
 - B. a carbohydrate
 - C. a fat
 - D. a fatty acid and glycerol
 - E. an amino acid
5. The movement of a plant in response to external stimulus of no particular direction is
 - A. taxism
 - B. tropism
 - C. haptotropic movement
 - D. nastic movement
 - E. phototropism
6. 'Jointed skeleton' is absent in the
 - A. cockroach
 - B. spider
 - C. millipede
 - D. snail
 - E. dragon fly
7. In a Biuret test, some protein was mixed with sodium hydroxide solution. Which of the following chemicals should be added to the mixture for positive result?
 - A. Mercurous nitrate
 - B. Copper sulphate
 - C. Mercuric nitrate
 - D. Sodium Carbonate
 - E. Ammonium hydroxide
8. Which of the following statements gives the BEST description of bark?
 - A. Tissues outside the vascular cambium
 - B. Cork-like tissues found only in stems

- C. Brown tissues never found in primary growth
 - D. Cork-like tissues of old trees

9. Nitrogen is released to the atmosphere by

 - A. nitrogen-fixing bacteria
 - B. nitrifying bacteria
 - C. denitrifying bacteria
 - D. saprophytic bacteria

10. The respiratory organ of land snail is
A. radula B. mantle
C. tentacle D. foot

11. The organelle responsible for heredity is labelled



A. I
B. II
C. III
D. IV

12. Which is the correct order in an evolutionary sequence for the following plant groups?

 - A. bacteria → ferns → algae → mosses → seed plants.
 - B. bacteria → ferns → mosses → algae → seed plants.
 - C. bacteria → algae → mosses → ferns → seed plants.
 - D. bacteria → mosses → algae → ferns → seed plants.

13. The habitat of the *cysticercus* of *Taenia solium* is
A. alimentary canal of cattle
B. muscle of pig
C. alimentary canal of pig
D. muscle of cattle

14. The exchange of genes between homologous chromosomes is called

 - A. test cross
 - B. back cross
 - C. crossing-over
 - D. mutation

15. The main function of the choroid is

 - A. protection of the eye ball
 - B. transmission of light
 - C. supply of nutrients to tissues of the eye
 - D. converging light

SUCCESS QUOTE

"A man only learns in two ways:
one by reading, and the other by
association with smarter people."

- Will Rogers

1. The cerebellum is located at the back of the brain under the cerebral hemispheres and is called the gyroscope of the body because it is concerned with balance. It receives information from the organs of balance in the ears and is concerned with the control and precision of all movements involving voluntary muscles. [B]
 2. Pasteurization is the process of heat processing a liquid or a food to kill pathogenic bacteria to make the food safe to eat. Milk can be pasteurized by heating to 75°C for 20 minutes. [C]
 3. For non-dormant seeds, germination starts when a seed is provided with water as long as the temperature is appropriate. The uptake of water by dry seed is called imbibition. As seeds imbibe water, they expand and enzymes and food supplies become hydrated. Hydrated enzymes become active and the seed increase its metabolic activities to produce energy for the growth process. [A]
 4. Carbohydrates are naturally occurring organic compounds containing carbon, hydrogen and oxygen, with the hydrogen and oxygen present in the ratio of 2:1, as in water. The general molecular formula for carbohydrate is $C_x(H_2O)_y$. [B]
 5. Note the following:
 - A tropism** is a movement of part of a plant in response to, and directed by an external stimulus.
 - A taxis** is a movement of an entire cell or organism (that is locomotion) in response to, and directed by, an external stimulus.
 - Nastic movements** are plant movements that occur in response to environmental stimuli but unlike tropic movements, the direction of the response is not dependent on the direction of the stimulus. Some of the most spectacular plant movements are nastic movements. These include the closing of the carnivorous Venus Flytrap leaf when it captures prey or the folding of the mimosa leaf when it is disturbed. [D]
 6. Jointed skeleton is absent in the snail. [D]
 7. The Biuret test is a chemical test used for detecting the presence of peptide bonds, which are the basis for the formation of proteins. In the presence of peptides, a copper(II) ion forms violet-coloured coordination complexes in an alkaline (eg NaOH) solution. [B]

8. Bark is a layer that covers woody stems. Usually, the term bark is used to refer either to all the tissues outside the vascular system, or more precisely to those tissues outside the cork cambium. [B]
9. Denitrifying bacteria are microorganisms that convert nitrates in soil to free atmospheric oxygen, depleting the soil of fertility and reducing agricultural productivity. [C]
10. Land snail is a common name for any of the numerous species of snail that live on land, as opposed to those that live in water. The respiratory organ of a land snail is called *pneumostome* or breathing pore located on the right side of the mantle. Through the pneumostome, air enters into the snail's 'lung'. [B]
11. Chromosomes are located within the nucleus. Chromosomes consists of DNA, which contains heredity information and instructions for cell growth, development, and reproduction. [B]
12. The correct order in the sequence is bacteria → algae → mosses → ferns → seed plants. [C]
13. *Taenia solium*, known as the pork tapeworm, has several different habitats depending on the stage in its life cycle. The habitat of the *oncosphere* of *taenia solium* is the gut and tissue of the pig host, after which it continues life in the *muscle and brain of the pig* in the *cysticercus* stage. The *cysticercus* form is also capable of surviving in a human host, living in the muscles and the brain. [B]
14. Chromosomal crossover (or crossing over) is the exchange of genetic material between homologous chromosomes that results in recombinant chromosomes during sexual reproduction. [C]
15. The main function of the choroid is to nourish the outer layers of the retina but it is also thought to regulate retinal heat, to assist in the control of intraocular pressure and the pigment absorbs excess light so avoiding reflection. [C]

**SUMMARY OF ANSWERS
[BIOLOGY 2015/2016 (1)]**

1.B	2.C	3.A	4.B	5.D
6.D	7.B	8.B	9.C	10.B
11.B	12.C	13.B	14.C	15.C

BIOLOGY 2015/2016 QUESTIONS [2]

Computer Based Test (CBT)

1. The spores of ferns are dispersed by
A. wind B. water
C. insect D. explosive mechanism
2. Which of the following is formed immediately after the first product of photosynthesis?
A. Lipid B. Starch
C. Oxygen D. Sugar
3. A dry fruit formed from two or more carpels containing several seeds is a
A. follicle B. legume
C. capsule D. schizocarp
4. Carbon monoxide poison tissues by
A. constricting the blood vessels
B. killing the cells
C. combining with haemoglobin
D. rupturing the blood vessels
5. The structures that prevent food particles from escaping through the fish gills are called gill
A. arches B. filaments
C. rakers D. lamellae
6. An old man is likely to be long-sighted because age affects the
A. optic nerves B. retina
C. ciliary muscles D. cornea
E. aqueous humour
7. Normally any character shown by an organism is due to the effects of
A. chromosomes
B. genes and environment
C. hormones and chromosomes
D. hormones and genes
E. mutations
8. Which of the following lacks chaetae, tentacle and antennae?
A. snail B. crab
C. millipede D. earthworm
9. Which of the following is a feature of the population pyramid of a developing country?
A. Low death rate B. Short lifespan
C. Long lifespan D. Low birth rate
10. In an experiment to investigate the effect of

nitrogen on the growth of plants, the substrate should be a medium of

- A. washed sand B. saw dust
C. cow dung D. clay soil

11. An onion is a bulb because it

- A. has a tuberous stem
B. has a reduced stem and thick fleshy leaves
C. has adventitious roots
D. bears many buds at the nodes

12. What do bacteria in root nodules derive from host plant?

- A. Protection and minerals
B. Water and minerals
C. Carbohydrates and water
D. Protection and carbohydrates

13. Fruits which develop without fertilization of the ovule are

- A. false B. multiple
C. aggregate D. parthenocarpic

14. A severe deficiency of thyroxin results in

- A. diabetes mellitus
B. sexual underdevelopment
C. cretinism
D. gigantism

15. A red-coloured flower when crossed with a white-coloured one produced pink flowers. This is an example of

- A. complete dominance
B. blending inheritance
C. interaction of genes
D. back crossing

SUCCESS QUOTE

"Deep inside you lives a great dream. A dream longing to come true. For your dream to come true, the first key victory you must win is over yourself. Stay out of your own way. Don't dream up a thousand reasons why you can't do what you want to do; find one reason why you can and just go ahead and do it."

~ John Mason

BIOLOGY 2015/2016 [2] ANSWERS

1. The sporophytes of ferns are well adapted to dry conditions and disperse their spores by explosive mechanism. Explosive mechanism is a self dispersal process that requires no external agent. [D]
2. Photosynthesis involves chemical reactions in which the sun's energy is transferred along a series of oxidation and reduction events until it is stabilized in the chemical bonds of a sugar called glucose. The glucose is used in respiration, or converted into starch and stored. Oxygen is produced as a by-product. *For the equation of photosynthesis, go to the answer to Question no 12 of year 2012/2013.* [B]
3. The capsule is a type of dry dehiscent fruit. It is composed of two or more carpels, which split apart (dehisce) to release the seeds, at maturity. [C]
4. Carbon monoxide is a toxic product of incomplete combustion of organic matter due to insufficient oxygen supply to enable complete oxidation to carbon dioxide (CO_2). It mainly causes adverse effects in humans by combining with hemoglobin to form carboxyhemoglobin (HbCO) in the blood. This prevents hemoglobin from carrying oxygen to the tissues, effectively reducing the oxygen-carrying capacity of the blood, leading to hypoxia. [C]
5. Gill rakers are bony or cartilaginous projections which point forward and inward from the gill arches. They aid in the fish's feeding by preventing stray particles or loose pieces from exiting through the gills. Normally, the size and arrangement of the gill rakers can signify what kind of food the fish eats. [C]
6. Note that *presbyopia* is the medical name for age-related long-sightedness. It is a normal part of ageing, and not a disease. In order to see close objects, the eyes have to accommodate. This means that the lens changes its thickness. The *ciliary muscles* are the muscles that bend and straighten the lens. As ageing sets in, the ciliary muscles begin to weaken and can no longer compensate for the limitation in near vision. [C]
7. The basic sources of character in living organisms are heredity and environment. Heredity refers to the genetic inheritance received by every organism at the time of conception. The environment here refers to all that is found around the organism both within the mother's womb and outside of the mother's womb at birth. Heredity and environment are interdependent forces. Whatever the heredity supplies, the favorable environment brings it out. [B]
8. Crab lacks chaetae, tentacle and antennae. [B]
9. A population pyramid, also called an age pyramid or

age picture diagram, is a graphical illustration that shows the distribution of various age groups in a population (typically that of a country or region of the world), which forms the shape of a pyramid when the population is growing. Developing countries have a fairly triangular shaped pyramid with a very wide base (implying a high proportion of young people) and a narrow top (meaning that fewer people make it to the older age groups). [B]

10. Cow dung should be the substrate because of its organic nature and its ability to attract microbial population. [C]

11. *Bulb* is one of the four types of underground stems, others being rhizome, tuber, and corm. Bulbs have reduced stem represented by a short disc. The lower surface of the stem produces many adventitious roots just like you have in onion and garlic. The inner leaves are fleshy while the outer ones are dry. This is known as tunicated bulb since the concentric leaf bases form a complete covering or tunic. [B]

12. The relationship between bacteria in root nodules and the host plant is an example of mutualism. The bacteria live and multiply in the nodules converting free nitrogen in the soil to organic compounds, which are used by the plant for their metabolic activities. In return, the plant provides the bacteria with shelter and organic nutrients such as sugar and vitamins. [D] *Note that minerals are inorganic comp'ds.*

13. Parthenocarpy (literally meaning virgin fruit) is the natural or artificially induced production of fruit without fertilization of ovules. The fruit is therefore seedless. [D]

14. Under-secretion of thyroxine before maturity causes cretinism. A cretin is physically underdeveloped (dwarfed in size), mentally retarded and sexually immature, in addition to being sluggish as a result of low metabolic rate. [C]

15. Blending inheritance is the expression in offspring of phenotypic characters (as pink flowers from red and white parents) intermediate between those of the parents. In other words, the genetic material of offspring is a uniform blend of those of the parents. [B]

SUMMARY OF ANSWERS [BIOLOGY 2015/2016 (2)]

1.D	2.B	3.C	4.C	5.C
6.C	7.B	8.B	9.B	10.C
11.B	12.D	13.D	14.C	15.B

BIOLOGY 2017/2018 QUESTIONS (1)

Computer Based Test (CBD)

1. One example of fossil fuels is
 - A. coral
 - B. limestone
 - C. firewood
 - D. coal

2. A flower that has both stamens and pistil is said to be
 - A. staminate
 - B. pistillate
 - C. perfect
 - D. imperfect

3. The speed of the wind can be measured with an instrument called
 - A. hydrometer
 - B. secchi disc
 - C. anemometer
 - D. wind vane

4. In Nigeria, the Guinea savanna belt borders the
 - A. mangrove swamps and the sahel savanna
 - B. rainforests and the Sudan savanna
 - C. deserts and the Sudan savanna
 - D. rainforests and the desert

5. The soil with the highest water-retaining capacity is
 - A. clayey soil
 - B. stoney soil
 - C. sandy soil
 - D. loamy soil

6. A food web is more stable than a food chain because
 - A. it contains more organisms
 - B. it is not easy to destroy
 - C. it has greater energy source
 - D. every organism has an alternative food source

7. Which of the following can bring about the greatest increase in the rate of transpiration?
 - A. Increased humidity
 - B. Reduced temperature
 - C. Reduced wind speed
 - D. Reduced humidity

8. Trace elements are required by plants mainly for the
 - A. formation of pigments and enzymes
 - B. production of energy and hormones
 - C. manufacture of carbohydrates
 - D. manufacture of proteins

9. A characteristic feature of tropical rainforest is that it
- contains trees with narrow leaves.
 - contains large number of plant species.
 - contains fewer number of plant species.
 - has total annual rainfall of less than 50cm.
10. The chemical name given to vitamin B₁ is
- thiamine
 - riboflavin
 - niacin
 - pyridoxine
11. The site for protein synthesis in a cell is
- golgi apparatus
 - ribosome
 - lysosomes
 - nucleus
12. The pollutant that is biodegradable is
- heavy metals
 - cellophane
 - sewage
 - crude oil
13. Which of these membranes separate the cell wall from the cytoplasm?
- Tonoplast
 - Cellulose cell wall
 - Middle lamella
 - Plasmalemma
14. Which of the following is *not true* about anabolism?
- It is a building process
 - It is an endothermic reaction
 - It is an exothermic reaction
 - It tends to the production of larger molecules
15. The influence of soil on organisms in a habitat is referred to as
- edaphic
 - physiographic
 - biotic
 - topographic

SUCCESS QUOTE

"If you are not willing to learn, no one can help you. If you are determined to learn, no one can stop you."

~ Unknown

BIOLOGY 2017/2018 [1] ANSWERS

1. Fossil fuels are sources of energy that have developed within the earth over millions of years. Because fossil fuels - oil, natural gas, and coal - take so long to form, they are considered nonrenewable. [D]
2. A *perfect flower* is one that contains both the male and female parts and may be described as "bisexual" or "hermaphroditic". It can pollinate itself and does not need wind, insects or other means to transfer its pollen. Examples of crops with perfect flowers include apples, cherries and legumes. [C] *For more, go to Bio 151 (Quick Revision Aid), no 94.*
3. An anemometer is an instrument used to measure the speed or velocity of air (gases) either in a contained flow, such as airflow in a duct, or in unconfined flows, such as atmospheric wind. [C]
4. The Guinea Savanna occupies nearly half of Nigeria and is the broadest vegetational zone in the country. It stretches around the middle of the country in areas where there is between 100-150 centimeters annual rainfall and wet season of between 6 to 8 months. The Rain Forest Stretches from the western boundary of Nigeria southeastwards around Ibadan and Benin. Sudan Savanna is in the northern extreme of the country in places like the Sokoto plains of Hausa and up to the Chad Basin. [B]
5. The soil's ability to retain water is strongly related to particle size; water molecules hold more tightly to the fine particles of a clay soil than to coarser particles of a sandy soil, so clays generally retain more water. [A]
6. A food chain is a linear sequence of organisms through which nutrients and energy pass as one organism eats another. In a food chain, each organism occupies a different trophic level, defined by how many energy transfers separate it from the basic input of the chain. Food webs consist of many interconnected food chains and are more realistic representation of consumption relationships in ecosystems. In a food web a particular organism has the probability of being eaten by various other organism and that particular organism can also eat many organisms.

It is just like clubbing a lot of food chains together. [D]

7. Transpiration is the process of water movement through a plant and its evaporation into the atmosphere from its aerial parts. Transpiration occurs chiefly through the stomata of the leaves. Environmental factors can affect the rate of transpiration include light, temperature, wind, humidity. *Humidity* is expressed as the percentage of water vapour present in the atmosphere. The higher the relative humidity of the outside atmosphere, the lower the rate of transpiration and vice versa. [D]

8. Note that trace elements are fundamental for any plant. Without trace elements, plants show abnormalities such as reproduction and growth abnormalities. Plants utilize small quantities of trace elements to form *enzymes* and other organic components. Iron is the most dominant trace mineral element and its deficiency can be a detriment to crop yields. Iron plays a vital role during nitrogen fixation. Also, iron acts as an oxygen carrier hence significant during the *production of chlorophyll* critical for photosynthesis. [A]

9. The tropical rainforest is the richest biome in the world, containing more species per square mile than any other forest. A tropical rainforest can have more than 480 tree species per hectare. Insects species are the most abundant in the rainforests. [B]

10. Read and master the chemical names of vitamins as listed below.

Vitamin A - Retinol	Vitamin B ₁ - Biotin
Vitamin B ₁ - Thiamine	Vitamin B ₂ - Folic acid
Vitamin B ₂ - Riboflavin	Vitamin B ₁₂ - Cyanocobalamin
Vitamin B ₃ - Niacin	Vitamin C - Ascorbic acid
Vitamin B ₅ - Pantothenic acid	Vitamin D - Calciferol
Vitamin B ₆ - Pyridoxin	Vitamin E - Tocoferol
	Vitamin K - Phylloquinone & Menaquinones
	[B]

11. The ribosome is a complex molecular machine, found within all living cells, that serves as the site of biological protein synthesis. Ribosomes link amino acids together in the order specified by messenger RNA molecules. [B]

12. Biodegradable substances are substances that are capable of being broken down (decomposed) rapidly by the action of microorganisms. They include food scraps, cotton, wool, wood, human and animal waste, manufactured products based on natural materials (such as paper, and vegetable-oil based soaps). [C]

13. The cell membrane (also known as the plasma membrane or cytoplasmic membrane, and historically referred to as the *plasmalemma*) is a biological membrane that separates the interior of all cells from the outside environment (the extracellular space). The basic function of the cell membrane is to protect the cell from its surroundings. [D]

14. Anabolism is an endothermic process since it absorbs energy. This continuous energy is supplied by various substances at the expense of their being and this process is called catabolism. Since catabolism releases energy it is an exothermic process. Together the Anabolism and Catabolism is called metabolism. [C]

15. Note that a biotic factor is any living component that affects the population of another organism, or the environment. This includes animals that consume the organism, and the living food that the organism consumes. Biotic factors also include human influence, pathogens, and disease outbreaks. An abiotic factor is a non-living component in the environment. This can be either a chemical or physical presence. Abiotic factors fall into three basic categories: climatic, edaphic and social. Climatic factors include humidity, sunlight and factors involving the climate. *Edaphic refers to soil conditions, so edaphic abiotic factors include soil and geography of the land.* Social factors include how the land is being used and water resources in the area. [A]

SUMMARY OF ANSWERS [BIOLOGY 2017/2018 (I)]

1.D	2.C	3.C	4.B	5.A
6.D	7.D	8.A	9.B	10.B
11.B	12.C	13.D	14.C	15.A

SUCCESS QUOTE

"Ninety-nine percent of all failures come from people who have a habit of making excuses."

~ George Washington Carver

BIOLOGY 2017/2018 QUESTIONS [2]

Computer Based Test (CBT)

1. The study of the organism and the environment of an abandoned farmland is the ecology of
A. a community B. a population
C. a habitat D. an ecosystem

2. All the sons of a colour-blind woman will be colour blind regardless of the state of the father because
A. the egg determines the phenotype of the sons
B. sons inherit the sex chromosomes of their mothers
C. the father's sex chromosomes is weaker in sons
D. sex-linked traits express dominance in females

3. In human reproduction, the zygote formed as a result of fertilization gets attached to the wall of the uterus. The process is called
A. sexual reproduction B. cohesion
C. pregnancy D. implantation

4. An onion bulb stores its food in the
A. stem B. leaves
C. roots D. cotyledon

5. Which one of the following is *never* a secondary host of tapeworms?
A. man B. fish C. pig D. dog

6. The response of plant parts to contact or touch is termed
A. thigmotropism B. traumatropism
C. rheotropism D. galvanotropism

7. In man, identical twins occur when
A. an ovum is fertilized by a sperm and then divides into two each forming a separate embryo
B. an ovum is fertilized by two sperms and then divides into two, each forming an embryo
C. two ova are fertilized at the same time each forming an embryo
D. two ova are fertilized by a single sperm each forming an embryo after fertilization
E. one ovum first divides into two and each half is fertilized by a sperm before developing into an embryo

8. If a child can receive blood from all donors, he belongs to the blood group
A. O B. A C. B D. AB

9. Which of the following group of factors is completely abiotic?

- A. Salinity, tide, plankton, turbidity
- B. Temperature, pH, soil, insect
- C. Wind, altitude, humidity, light
- D. Conifers, wind, pH, rainfall

10. Erosion can be reduced along a slope by

- A. ridging across slope
- B. ridging up slope
- C. ridging down slope
- D. crop rotation

11. Water retention is highest in soils which are rich in

- A. sand, poor in humus and devoid of clay
- B. clay and sand, but poor in humus
- C. clay and humus, but poor in sand
- D. clay, poor in humus and devoid of sand

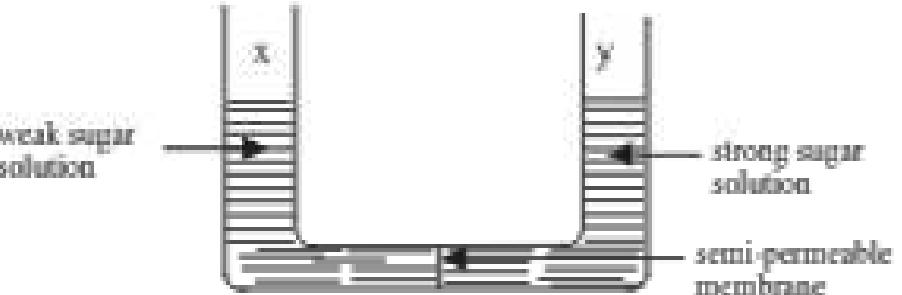
12. In an ecosystem, animals which feed directly on plants are called

- A. secondary consumers
- B. primary consumers
- C. producers
- D. predators

13. Which of the following ecological factors are common to both terrestrial and aquatic habitats?

- A. Rainfall, temperature, light and wind
- B. Salinity, rainfall, temperature and light
- C. Tides, wind, rainfall and altitude
- D. pH, salinity, rainfall and humidity

- 14.



After 30 minutes, the level of sugar solution in the above figure will

- A. rise in x only
- B. rise in y only
- C. be the same in x and y
- D. fall in y

15. Haemophilia results from the mutation of the genes

- A. in the sex chromosomes
- B. which control skin colour
- C. which control the mechanism for blood clotting
- D. which control the formation of haemoglobin

BIOLOGY 2017/2018 [2] ANSWERS

1. The study of the organism and the environment of an abandoned farmland is the ecology of an ecosystem. An ecosystem is a community of living organisms in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system. These biotic and abiotic components are regarded as linked together through nutrient cycles and energy flows. [D]
2. Sex-linked traits express dominance in females. [D]
3. In humans, implantation is the stage of pregnancy at which the already fertilized egg adheres to the wall of the uterus. [D]
4. A bulb consists of a relatively large, usually globe-shaped, underground bud with membranous or fleshy overlapping leaves arising from a short stem. A bulb's fleshy leaves — which in some species are actually expanded leaf bases — function as food reserves that enable a plant to lie dormant when water is unavailable (during winter or drought) and resume its active growth when favourable conditions again prevail. An onion is a commonly known bulb. [B]
5. The life cycle of tapeworms is indirect. It passes through pigs, as intermediate hosts, into humans, as definitive hosts. From humans, the eggs are released in the environment where they await ingestion by another host. *Humans as the definitive hosts* are directly infected from contaminated meat. [A]
6. Tropisms are natural responses of organisms to external stimuli. *Thigmotropism* is a response that is often seen in plants in response to touch or contact. [A]. *For more on this, read the Bonus Tip at the end of 2011/2012 Answers.*
7. There are two types of twins – identical (monozygotic) and fraternal (dizygotic). Identical Twins occur when a single egg is fertilized by a single sperm to form one zygote but the zygote then divides into two separate embryos. Fraternal Twins (commonly known as “non-identical twins”) usually occur when two fertilized eggs are implanted in the uterine wall at the same time, that is, when the mother releases two eggs and both become fertilized by two different sperms. The two eggs form two zygotes. [A]

8. Recipients with *blood type AB* can receive a kidney from blood types A, B, AB and O. This implies that recipients with AB blood are compatible with any other blood type. AB is the universal recipient. [D]
9. Wind, altitude, humidity, light are abiotic factors because they are non-living components in the environment. [C]
10. Contour plowing (or contour farming) is the farming practice of plowing and/or *planting across a slope* following its elevation contour lines. These contour lines create a water break which reduces the formation of rills and gullies during times of heavy water run-off; which is a major cause of soil erosion. [A]
11. Water retention is highest in soils which are rich in clay, poor in humus and devoid of sand. *For more details, read the answer to Question no 5, 2017/2018 (1).* [D]
12. Within an ecological food chain, consumers are categorized into three groups: primary consumers, secondary consumers, and the tertiary consumers. Primary consumers are usually herbivores, feeding on plants and fungus. Secondary consumers, are mainly carnivores, and prey on other animals. Tertiary consumers, sometimes also known as apex predators, are usually at the top of food chains, capable of feeding on secondary consumers and primary consumers. Tertiary consumers can be either fully carnivorous or omnivorous. Humans are one such example of a tertiary consumer. [B]
13. Rainfall, temperature, light and wind are the ecological factors common to both terrestrial and aquatic habitats. [A]
14. Osmosis is a phenomenon where pure water flows from a dilute (or weaker) solution through a semi-permeable membrane to a higher concentrated (or stronger) solution. Therefore, the level of sugar solution will rise in y only. [B]
15. [C] *For more, go to Question No 10, year 2009/2010*

SUMMARY OF ANSWERS [BIOLOGY 2017/2018 (2)]

1.D	2.D	3.D	4.B	5.A
6.A	7.A	8.D	9.C	10.A
11.D	12.B	13.A	14.B	15.C

BIOLOGY 2018/2019 QUESTIONS

Instruction: There are 17 Questions in this section.
You are expected to answer 15 Questions only.

1. One adaptation shown by hydrophytes in freshwater habitats is
 - A. leaves reduced to spine
 - B. poor development of roots and xylem tissues
 - C. waxy cuticle on shoot surface
 - D. well-developed roots and supporting system
2. In which region of the human body does the adult filarial worm reside?
 - A. Muscle
 - B. Nervous system
 - C. Blood
 - D. Lymph
3. The two key cations involved in the action potential of nervous transmissions are
 - A. Na^+ and Fe^{2+}
 - B. Mg^{2+} and K^+
 - C. Na^+ and K^+
 - D. Fe^{2+} and Mg^{2+}
4. The anaerobic fermentation of glucose molecule yields
 - A. 38 ATP molecules
 - B. 2 ATP molecules and alcohol
 - C. pyruvic acid and alcohol
 - D. water and carbon(IV) oxide
5. Alternation of generation is a feature shown in
 - A. mosses
 - B. fungi
 - C. grasses
 - D. conifers
6. The brightly coloured eye spots on the hind wings of a moth are an example of
 - A. crypsis
 - B. mimicry
 - C. warning colouration
 - D. disruptive colouration
7. In which of the following biomes is the south western part of Nigeria located?
 - A. Tropical woodland
 - B. Desert
 - C. Temperate forest
 - D. Tropical rainforest
8. Which of the following can cause shrinkage of living cells?
 - A. Deionized water
 - B. Hypertonic solution
 - C. Hypotonic solution
 - D. Isotonic solution
9. Mycorrhizae promote plant growth by
 - A. protecting it from infection
 - B. helping it to utilize atmosphere nitrogen
 - C. serving as a growth regulator
 - D. absorbing inorganic ions from the soil

10. Which of the following characterizes a mature plant cell?
 - A. The nucleus is pushed to the centre of the cell
 - B. The cell wall is made up of cellulose
 - C. The nucleus is small and irregular in shape
 - D. The cytoplasm fills up the entire cell space
11. The enzymes of the glycolytic pathway are located in the
 - A. mitochondria
 - B. gastric juice
 - C. plasma
 - D. cytoplasm
12. In mammals, the organ directly on top of the kidney is the
 - A. thyroid gland
 - B. adrenal gland
 - C. pancreas
 - D. prostate gland
13. Rodents gnaw on food with their
 - A. molar teeth
 - B. strong jaws
 - C. flat-ridged teeth
 - D. chisel-like front teeth
14. Identical twins inherit their genes from
 - A. different eggs and sperms
 - B. the same egg and sperm
 - C. two eggs and a sperm
 - D. one egg and two sperms
15. Homologous pairs of chromosomes separate during
 - A. cytolysis
 - B. cleavage
 - C. mitosis
 - D. meiosis
16. When a marine fish was taken from the ocean and put in a tank of fresh water, it died after a short period because
 - A. the tank was too small compared to the large ocean.
 - B. the body cells of the fish swelled and bursted as a result of the hypotonic fresh water
 - C. the body cells of the fish shrank as their sap was hypertonic to the fresh water
 - D. there was no food in the tank, so the fish starved
17. The caste of termites that lacks pigmentation is the
 - A. king
 - B. worker
 - C. soldier
 - D. queen

SUCCESS QUOTE
“The beautiful thing about learning is that no one can take it away from you.”
~B.B King

BIOLOGY 2018/2019 ANSWERS

1. *Hydrophytes* are plants that have adapted to life in very wet places. They have little to no root system because, unlike land plants, because roots are not as necessary since water is so readily available. [B]
2. The filarial worms are tissue-dwelling parasites. The parasite is transmitted by mosquitoes. After infection, the adult filarial worms migrate to and live in the lymphatic ducts of humans. There, they clog up the blood vessels and cause the enlargement of the various body parts. [D]
3. An *action potential* occurs when a neuron sends information down an axon, away from the cell body. As an action potential travels down an axon, there is a change in polarity across the membrane of the axon. In response to a signal from another neuron, sodium (Na^+) and potassium (K^+) ion channels open and close as the membrane reaches its threshold potential. [C]
4. Anaerobic fermentation is a method cells use to extract energy from carbohydrates when oxygen and other electron acceptors are not available in the surrounding environment. The anaerobic fermentation of glucose molecule yields 2 ATP molecules and alcohol. [B]
5. In moss plants, gametophytic generation, represented by the main plant body alternates with sporogonium, representing sporophytic generation, which is permanently attached to gametophyte. [A]
6. The brightly coloured eye spots on the hind wings of a moth are an example of mimicry. Mimicry is a phenomenon characterized by the superficial resemblance of two or more organisms that are not closely related taxonomically. This resemblance confers an advantage - such as protection from predation - upon one or both organisms by which the organisms deceive the animate agent of natural selection. [B]
7. Tropical rainforest [D]
8. A hypertonic solution is a particular type of solution that has a greater concentration of solutes on the outside of a cell when compared with the inside of a cell. Since the concentration of water is higher within the cell, there is a net movement of water from inside to outside of the cell. Water loss from both vacuole and cytoplasm causes the cell to shrink. [B]
9. A mycorrhiza is a symbiotic association between a fungus and the roots of a vascular host plant. Mycorrhizae form a network of filaments that associate with plant roots and draw nutrients from the soil that the root system would not be able to access otherwise. This fungus-plant alliance stimulates plant growth and accelerates root development. [D]
10. The cytoplasm fills up the entire cell space [D]
11. About 7 out of the 10 enzymes that constitute the glycolytic pathway are located in the mitochondria. [A]
12. The adrenal glands are located on top of each kidney. In fact, their name directly relates to their location (*ad* = near or at; *renes* = kidneys). [B]
13. Mammals have four kinds of teeth, that differ in shape, function, position in the mouth. The four types are *incisors*, *carnies*, *premolars*, and *molars*. Rats have incisors and molars. The rat's incisors are the four long frontmost teeth in the rat's mouth. They are specialized for gnawing. [D]
14. Identical twins are monozygotic, meaning that they develop from one zygote which splits and forms two embryos. In other words, a single ovum is fertilized by a sperm cell. [B]
15. meiosis [D]
16. the body cells of the fish swelled and bursted as a result of the hypotonic fresh water. [B]
Compare this with the answer to question no 8.
17. Termites are highly specialized social insects. They form colonies and have three distinct forms of castes: the parent caste (king and queen), the soldier caste and the worker caste. The worker caste, which is the food gatherer and builder, is sterile, wingless and lacks pigmentation in most species. [B]

SUMMARY OF ANSWERS [BIOLOGY 2018/2019]

1.B	2.D	3.C	4.B	5.A	6.B
7.D	8.B	9.D	10.D	11.A	12.B
13.D	14.B	15.D	16.B	17.B	

SUCCESS QUOTE

"Some are Destined to Succeed,
Some are Determined to Succeed."
~H. H. Swami Tapandanda

BIOLOGY 2019/2020 QUESTIONS

Instruction: There are 17 Questions in this section.
You are expected to answer 15 Questions only.

1. The mode of nutrition of sundew and bladderwort can be described as
A. saprophytic B. holozoic
C. chemosynthetic D. autotropic
2. The two halves of the pelvic girdle are joined together at the
A. ilium B. pubis
C. obturator foramen D. pubic symphysis
3. All living organism
A. Photosynthesize B. Breathe
C. Move D. Feed
4. The flippers of a whale and the fins of a fish are examples of
A. coevolution B. convergent evolution
C. divergent evolution D. continuous evolution
5. The most important plant hormone is
A. abscisic acid B. auxin
C. gibberellin D. cytokinin
6. In the kidney of mammals, the site of ultrafiltration is the
A. uriniferous tubule B. Bowman's capsule
C. loop of Henle D. renal tubule
7. The presence of a diastema in the jaw bone indicates that the mammal lacks the teeth suitable for
A. tearing B. chewing
C. cutting D. chewing and tearing
8. An old man is likely to be long-sighted because age affects the
A. optic nerves B. retina
C. ciliary muscles D. cornea
9. The part of the brain responsible for peristalsis is the
A. olfactory lobe B. medulla oblongata
C. hypothalamus D. thalamus
10. The use and disuse of body parts and the inheritance of acquired traits were used to explain
A. Darwin's theory B. Lamarck's theory
C. genetic drift D. gene flow
11. Organisms living in an estuarine habitat are adapted to
A. withstand wide fluctuations in temperature.
B. survive only in water with low salinity.
C. withstand wide fluctuations in salinity
D. feed only on phytoplankton and dead organic matter.

12. The male cockroach differs from the female by having
A. mandibles B. a pair of styles
C. spiracles D. a pair of cerci
13. The function of the clitellum in the earthworm is to
A. aid digestion B. prevent desiccation
C. assist locomotion D. secrete cocoon
14. Which of the following is the function of lymph?
A. Carries hormones round the body.
B. Transports nutrients and oxygen from blood capillaries to the cells
C. Distributes heat uniformly round the body.
D. Conveys amino acids and glucose from the small intestine to the liver.
15. Osmic acid boiled with a solution of food substance gave a black precipitate. This indicates the presence of
A. fats and oils B. proteins
C. amino acids D. starch
16. Fruits which develop without fertilization are described as
A. simple B. pathenocarpic
C. aggregate D. compound
17. Viruses are considered to be living organisms because they
A. possess transmittable characters
B. move from one place to another
C. respond to stimulation
D. ingest food materials

BONUS TIP

"Like I've said over and over, UNN Post-UTME Screening Examination is very competitive. One of the passports to disappointment and failure in the exam is inadequate preparation.

If you really desire to excel in the exam and eventually gain admission, you must study very extensively. Read your textbooks, cover all the topics, understand the concepts and then practise with your past questions. Do that over and over as your exam date approaches.

Anything short of this is inadequate and may cause you not to smile out of the hall on that day."

~ Henry Divine

BIOLOGY 2019/2020 ANSWERS

1. **Holozoic nutrition** is a method of nutrition that involves the ingestion of liquid or solid organic material, digestion, absorption and assimilation of it to utilize it. It includes insectivorous, carnivorous, herbivorous and omnivorous nutrition. Sundew and bladderwort are insectivorous plants (i.e. they trap and feed on insects) which live in soils deficient of nitrogen which they require for the synthesis of protein. To make up for the nitrogen, they trap and digest insects. [B]

2. Note the following carefully:

The ilium is the uppermost and largest part of the hip bone, and appears in most vertebrates including mammals and birds, but not bony fish.

The pubis (also called pubic bone) is a paired bone that forms the anterior part of the hip bone, and the anterior and inferior boundary of the obturator foramen.

The obturator foramen is the large opening created by the ischium and pubis bones of the pelvis through which nerves and blood vessels pass.

The pubic symphysis is a secondary cartilaginous joint located between the left and right pubic bones near the midline of the body. The left and right pubic bones join at the pubic symphysis. [D]

3. This question raised heated arguments in one of our online tutorial classes. Hence, the need to explain a few things here.

The characteristics exhibited by all living organisms are: Movement, Respiration, Nutrition, Irritability, Growth, Excretion, Reproduction (MR NIGER D). The main source of confusion here is *nutrition* which has to do with the organism's need for food as a source of energy, and materials for the processes of life. You must note that there are two sources of energy used by living organisms, namely light and chemical energy. Those organisms specialized for using light energy carry out photosynthesis while those which use chemical energy must obtain it by feeding on other living organism. [B]

Consider the follow-up questions at the end of 2019/2020 Answers

4. **Convergent evolution** is the process whereby organisms not closely related (not monophyletic), independently evolve similar traits or structures as a result of having to adapt to similar environments or ecological niches. These structures perform the same function but have different structural organization. Examples are wings in birds and butterflies; flippers in whales and fins in fishes.

Divergent evolution is the process whereby groups from the same common ancestor evolve and

accumulate differences, resulting in the formation of new species. Divergent evolution may occur as a response to changes in abiotic factors, such as a change in environmental conditions, or when a new niche becomes available. [B]

5. *A hormone* is any chemical produced in one part of the body that has a target elsewhere in the body. Plants have five classes of hormones: Auxins, Gibberellins, Cytokinins, Abscisic Acid and Ethylene, the most important being *Auxins*. Auxins are produced in the stem, buds, and root tips. They promote stem elongation and inhibit growth of lateral buds (maintains apical dominance). [B]

6. *Ultrafiltration* is the first of three processes by which metabolic wastes are separated from the blood and urine is formed. It is the non-specific filtration of the blood under high pressure and occurs in the Bowman's capsule of the nephron. [B]

7. *A Diastema* is a wide gap that separates rows of teeth. In plant-eating mammals, the diastema separates the biting teeth at the front of the jaw, from the chewing teeth at the rear. This is largely because during the course of evolution, herbivores stopped consuming meat and depended entirely on plants for their energy requirements. Hence they no longer required the services of canine tooth for piercing and tearing into meat or flesh. [A]

8. Age-related longsightedness is called *presbyopia*. It is a gradual thickening and loss of flexibility of the natural lens inside the eye. These age-related changes occur within the proteins in the lens (making it harder and less elastic over time). More so, age-related changes also take place in the muscle fibers (ciliary muscle) surrounding the lens. With less elasticity, it gets difficult for the eyes to focus on close objects. [C]

9. *Peristalsis* is a series of wave-like muscle contractions that moves food to different processing stations in the digestive tract. The process of peristalsis begins in the esophagus when a bolus of food is swallowed. The part of the brain which controls peristalsis is the *medulla oblongata*. The medulla oblongata also controls other involuntary actions including heartbeat, breathing, etc [B]

10. *Lamarck's theory of evolution* is based on the principle that acquired traits or physical changes in organisms during their lifetime—such as greater development of an organ or a part through use and disuse—could be transmitted to their offspring. [B]

Compare with Biology 151 (Quick Revision Aid) No 98.

11. An estuarine habitat occurs where salty water from the ocean mixes with freshwater from the land. The water is generally partially enclosed or cut off from the ocean, and may consist of channels, sloughs, and mud and sand flats. River mouths, lagoons, and bays often constitute estuarine habitat. Within any estuary, salinity fluctuates with the seasons and tides and organisms living in such habitats must be adapted to withstand such fluctuations. [C]

12. The differences between male cockroach and female cockroach:

Male Cockroach	Female Cockroach
a. Larger in size.	a. Smaller in size.
b. Narrow abdomen.	b. Broad abdomen.
c. Brood pouch is absent.	c. Brood pouch is present.
d. Testes and accessory organs are present.	d. Ovaries and accessory organs are present.
e. Wings extend beyond the abdomen.	e. Wings extend up to the abdomen.
f. Anal styles are present.	f. Anal styles are absent.

[B]

13. The clitellum is a thickened glandular and non-segmented section of the body wall near the head in earthworms and leeches, that secretes a viscid sac (cocoon) in which the eggs are deposited. It is located near the anterior end of the body. Its main function is to store the eggs of the worm. [D]

14. *Lymph* is a colourless fluid containing white blood cells, which bathes the tissues and drains through the lymphatic system into the bloodstream. The primary function of the lymphatic system is to return amino acids and excess interstitial or extracellular fluid (containing oxygen, glucose, amino acids, and other nutrients needed by tissue cells) to the bloodstream. The second function of the lymphatic system is the absorption of fats and fat-soluble vitamins from the digestive system and the subsequent transport of these substances to the venous circulation. [B]

15. When osmic acid is boiled with a small quantity of oil or fat in a test tube, a black precipitate indicates the presence of oil or fat. [A]

16. Parthenocarpy is the natural or artificially induced production of fruit without fertilization of ovules, which makes the fruit seedless. Varieties of the pineapple, banana, and cucumber exemplify naturally occurring parthenocarpy. [B]

17. Candidates need to be careful with this kind of question. The question implies that viruses are considered both living and non-living for specific reasons. We are required to give the reason why

viruses may be considered to be living organisms. Viruses are considered to be living organisms because they possess characters which can be transmitted from one generation to another. Actually, there are two parts that make up every virus. First, there is the genetic material (which exists in the form nucleic acid as found in the cells of any living organism). Some viruses contain ribonucleic acid (RNA) while others have deoxyribonucleic acid (DNA) molecules. The second basic component of a virus is a protein coat. This coat is made up of identical units of protein that assemble into structures as coded by their genetic material, the RNA or DNA molecule they cover. [A]

SUMMARY OF ANSWERS [BIOLOGY 2019/2020]

1.B	2.D	3.B	4.B	5.B	6.B
7.A	8.C	9.B	10.B	11.C	12.B
13.D	14.B	15.A	16.B	17.A	

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