

UNIVERSITY OF ILLORIN (UNIILLORIN) POST-UTME SCREENING Past Questions & Solutions 2012 – 2005

UNIVERSITY OF ILLORIN

2007 POST UME TEST

INSTRUCTION TO CANDIDATES

PLEASE ENSURE THAT YOU HAVE SUBMITTED ONE DOWNLOADED ON-LINE REGISTRATION FORM BEFORE AND AFTER THE EXAMINATION.

Calculators, Cell Phones and other electronic devices are not allowed. Any form of examination malpractice automatically disqualifies the candidate. Candidates may use logarithm tables.

ANSWER ALL QUESTIONS TIME ALLOWED:

Shade the answer sheet as appropriate with HB pencil only

USE OF ENGLISH

Each of questions 1-5 below, choose the following that is nearest in meaning to each of the underlined word or phrase in each sentence.

1. The idea expressed by the chairman of the party is make— believe

- (a) the idea of good (b) the idea is impressive
(c) the idea is well conceived (d) the idea is a form of pretence.

2. It rained cat and dog

- (a) it rained mercilessly (b) it rained drastically (c) it rained heavily (d) it rained pieces.

3. Bolanle was taken on as graduate assistant in the university

- (a) Bolanle was laid off (b) Bolanle was denoted
(c) Bolanle was employed (d) Bolanle was promoted.

4. Toe's emphalate disposition to life has really recorded her the chance to become the Minister of Internal Affairs

- (a) expressive mannerism (b) coolative outlook of life
(c) internal And friendly way of life (d) spent able.

5. Biola managed to hold her head high and ignore what people were saying about her at the conference

- (a) Biola was rude to people (b) Biola was able to display her affluence
(c) Biola was discouraged (d) Biola was proud and obstinate.

6. It was calculated mutiny to dethrone the newly installed sultan of Iyanfoworogi

- (a) act of revival (b) act of loyalty (c) act of facility (d) act of rebellion.

7. The objectives of the work are well — delineated

- (a) well - done (b) well described and explained (c) well - focused (d) well - drawn.

8. The university review committee comment that Mr. Ojongbolo's vitae leaves must to be desired

- (a) highly commendable (b) highly recommended
(c) highly approved (d) highly unacceptable.

ANSWER KEY

1. C 2. C 3. C 4. C 5. D 6, D 7. B 8. D

BIOLOGY

1. Which of the following does not contribute to the biomass in an ecosystem.

- a. Producers b. Food chain c. Consumers d. Saprophytes

2. Terrestrial animals which are capable of maintaining constant body temperatures within fairly close limits are.

- a. Thermocines b. Homotherms c. Poikilotherms d. Sternotherms

3. The amount of moisture in the air (relative humidity) can be measured by

- a. hydrometer b. anemometer c. rain gauge d. hygrometer

4. Which of the following groups of plants would be the first colonies in an ecological succession on changing rocks to soil? a. Mosses b. Ferns c. Lichens d. Grasses
5. Plants adapted to life in salty water are called a. hydrophytes b. epiphytes c. halophytes d. xerophytes
6. The state in the life of bilharzias which infects man is the a. cercaria b. bladder worm c. miracidium d. Egg
7. The malpighian tubule plays a major role in a. inspiration b. excretion c. secretion d. digestion
8. The filtered blood from the kidney is carried back to the circulatory system, through the a. hepatic portal vein b. pulmonary vein c. renal vein d. renal artery
9. Flatworms are classified as a. Concentrate b. Annelid c. Platyhelminth d. Arachnida
10. A severe deficiency of thyroxin results in a. sexual underdevelopment b. cretinism c. gigantism d. diabetes mellitus
11. Haemolysis is an example of a. Hydrolysis b. Osmosis c. Plasmolysis d. Inhibition
12. Which of the following structures are visible in the cell of a mitosis a. Centrioles, chromatids and nucleolus b. Homologous chromosome, nuclear membrane c. Cell wall, centrioles and chromatids d. Chromosomes, nuclear membrane and centromere
13. At which of the following stages of cell division can the cell be resting? a. Anaphase b. Telophase c. Prophase d. Interphase
14. Mitochondria and chloroplasts are characteristic of cells that a. Reproducing and photosynthesizing b. Excreting and deaminating c. Respiring and photosynthesizing d. Replicating and photosynthesizing
15. Which of the following organelles help to remove excess water from a cell? a. Mitochondria b. Ribosome c. Contractile vacuole d. Golgi body
16. Which of the following tissues is made up of dead cells A. Meristem B. Cambium C. Xylem D. Phloem
17. Marriana handle in a monocotyledonous stem are found a. Watered in the epidermis b. The ring near the epidermis c. Between the condoderms and pericycle d. Scattered between the epidermis and the pith
18. Plants that can survive in an environment where water is scarce are referred to as a. Epiphytes b. Mesophytes c. Hydrophytes d. xerophytes
19. Green plants are primary producers because they are a. Heterotrophic b. Saprophytic c. Chlorophytic d. Autotrophic
20. The hypha of Rhizopus is said to be coenocytic because it a. does not contain chlorophyll b. has no cross walls c. is vacuolated d. stores oil globules
21. The skeleton of an arthropod is principally composed of a. pectin b. chitin c. lignin d. tannin
22. The aerobic stage of tissue respiration occurs through

- a. Energy cycle b. Kreb's cycle c. Water cycle d. Carbon cycle
23. Extracellular digestion take place in a. Green plants c. Algae d. Bryophytes
24. Which of the following reagents is used to test for starch
a. Million's test b. Fehling's solution c. Sudan III solution d. Iodine solution
25. The condition known as cretinism is caused by the deficiencies
a. Adrenalin b. Vitamin A c. Insulin d. Thyroxin
26. The key event in the transition of the amphibians from water to land is
a. possession of we skin b. possession of webbed limbs
c. replacement of gills with lungs d. development of lung hint limber
27. A group of organisms that are capable of free interbreeding is called
a. species b. genus c. family d. order
28. Which of the following organisms has only two body layers and a cavity?
a. Hydra b. Taenia Spp c. Ascaris d. Earthworm
29. Which of the following scientists was involved with organic evolution?
a. Mendel b. Lamark c. Morgan d. Luther
30. Poliomyelities is a microbial disease cause by
a. Amoeba b. Protozoa c. Virus d. Protists

Answer Key

1. D 7.A 13.D 19.D 25.D
2.B 8. C 14.C 20 – 26. C
3.D 9.C 15.C 21.B 27.A
4.C 10. B 16.C 22. B 28. A
5.C 11.B 17- 23.A 29.B
6.B 12.B 18.D 24.D 30C

Explanation to the question

1. Biomass takes into accounts both the size of the individual organisms and their numbers. The pyramid

- of biomass thus gives the accurate picture of the relationship between the organisms at the various tropic level in a food chain is just a mode of nutrition and it's not relevant in this context (D).
2. Homiotherms (Greek: homois: similar) animals keep their body temperature more or less constant, regardless of their surrounding (B)
3. Relative humidity is the measurement of the amount of moisture in the air and is determined by using a wet and dry bulb hygrometer (D).
4. Lichen is as a result of symbiosis relationship association between fungi and algae plant. It is the first stage of ecological succession. Lichen is the simplest of the options. (C).
5. Hydrophytes or aquatics live in fresh water and show a number of adaptation to their environment. Xerophytes are plants which can survive in place where water supply is limited. Epiphytes are involved in commensalism. Halophytes means plant in halides environment that is contain salts of chloride (C).
6. Miracidium larvae emerges and bores into foot of small Redia forms further larvae by internal propagation. Cercaria escapes from snail through pulmonary aperture. Encysted cercaria adheres to blade of grass in wet pasture land and get into man. (A)
7. Malphigian tubule is the excretory organ in insect (A).
8. The blood is transported to the Kidney through the artery and leaves the Kidney through Renal vein (C).
9. Flatworms are platyhelminthies (C).
10. Thyroxine is complex compounds which include iodine. An animal not producing enough becomes slow, may not grow to its proper size (cretinism) (B).
11. If a cell is placed in a weaker (i.e. hypotonic) solution, they swell and may even burst. The

phenomenon is known as haemolysis. Just like osmosis which in the movement of solvent molecule of high concentration to lower concentration through semi — permeable membrane.(B).

12. At the interphase, the chromosome are not visible as distinct bodies, either under light microscope or electron microscope at this stage, they form a long chromatin strands or threads. Not until prophase where the chromatin threads condense to form visible chromosome. The nucleolus disappear at the late prophase stage. Note: check textbooks. (B).

13. The interphase is described as Resting stage but it is a complete misnomer because the genetic material replicate and cell builds up at this stage (D).

14. Mitochondria is the power house, food material is oxidized to give energy while chloroplast is involved in photosynthesis(C).

15. Contractile vacuole helps in osmo regulation that is, regulation of amount of water in the cell. Ribosome is for protein synthesis.(C).

16. Meristem is the tissue capable of cell division. The xylem contains several large thick walled tubes called vessels in which the soil solution is carried from the root to the leaves, they do not contain cytoplasm i.e. they are dead. (C)

17. -

18. Xerophytes are plants that adapts to desert habitat (D).

19. Green plant are autotrophic, they synthesize their food themselves (D).

20. -

21. Chitin is a proteinous material that made up exoskeleton in insects(Arthropod) (B).

22. In terms of ATP — synthesis Krebs's cycle is the most important source of energy in metabolism and it achieves this by donating hydrogen atom(s) to the carrier system. This takes place during respiration (B).

23. Moulds are saprophytes, they feed on the dead bodies of plant or organic materials like bread. They therefore pass out enzymes from their cells on to the substrate (the material in which they feed) to make it soluble, this kind of digestion occurring outside the organisms called Extracellular digestion (A).

24. Starch turns iodine solution blue — black (D).

25. (D) See Qun 10

26. Amphibians use gill for gaseous exchange in aquatic environment while the gill is changed to lungs in Terrestrial habitat (C).

27. A.

28. Diploblastic animals have two cell layer in their body wall, an outer layer (ectoderm) and an inner endoderm e.g Coelentrates (Hydra) (A).

29. Larmack's theory states that when an organism develops a need for a particular structure, this induce its appearance (B).

30. C.

CHEMISTRY

1. The number of electrons in the K. L. M and N — shells of calcium are respectively

a) 2,8,8,2 b)2,2,8,8 c) 2,8, 2, 8, d) 8,8,2,2

2. The basic unit of synthetic rubber is

a) Isoprene b) pentane c) butadiene d) butene

3. What are the oxidation numbers of manganese in the anions MnO_2 and MnO_4^- ?

a) +7&+6 b)+2&+2 c) +4&+4

4. The empirical formula of a hydrocarbon that contains 93.3% carbon is C 12, H = 13

a) CH b) CH_2 c) C_2H d) C_2H_2

5. The type of hybridization in all the carbon in saturated hydrocarbon is

a) sp^3 b) sp^2

c) sp d) ps^2

6. Electrophiles are

- a) Electron deficient species b) Electron rich species
c) Free radical species d) Negatively charged species

Explanation to Questions

1. K-shells contain maximum of 2-electron, L shells can only contain maximum of 8 electrons, M-shells contain maximum of 18 electrons, N- contains 32 electrons.

Calcium with atomic number 20, shows that electrons are added to a shell until a stable duplet (for the K-shell) and an octet for L-shells. The increase in the number of electron result in the electrons occupying the shell with next highest energy level so calcium has 2, 8, 8, 2 (A).

2. Synthetic rubber is a polymer and the simple unit (monomer) is 2-methylbuta- 1, 3-diene known as isoprene unit (A).

3. $MnO_2 = -2$

$X + (-2 \times 2) = -2$

$X - 4 = -2$

$X = +2$

$MnO_4 = -1$

$X + (-2 \times 4) = -1$

$X = -1 + 8$

$X = +7$ (B)

4. C H % composition Mole ratio 92.3% 77 92.3/12

7.7/1 7.67 7.7

Mole ratio of element 7.67 7.7

Smallest mole ratio 7.67 7.67 = 1 1

Empirical formula CH (A)

5. Saturated hydrocarbons have single bond around its carbon, so they exhibit SP^3 hybridization (A)

6. Electrophiles are electron deficient species like NH_4^+ , H^+ (A)

UNIVERSITY OF ILLORIN 2007 POST UME TEST - BIOLOGY

1. The number of individual in a habitat is release to the unit space available to each organism is referred to as the

a. Birthrate b. Frequency c. Mortality d. Density

2. The group of bacteria that are involved in the conversion of ammonia to nitrate is

a. Antibacterial b. Neurosepoys c. Thizobium d. Clostridium

3. The sequence of ear ossicles from the sense ovalis

a. Malleus, incus and stepes b. Malleu, stepes and incus
c. Stepes, incus and malleus d. Stepes, malleus and incuse

4. The major function of the cell membrane is that

a. Delimits the cytoplasm b. Synthesis protein
c. Breakdown spindles d. Is the sites of photosynthesis

5. The network of double membrane that conveys material through the cytoplasm

a. Plasma membrane b. Vaccine membrane
c. Nuclear membrane d. Golgi body membrane

6. In the plants exhibiting alternation of generation the diploid multicellular stage known as

a. Sporophytes b. Gametophyte c. Hetaphyte d. Cimatiophyte

7. Secondary thickening is initiated in the dicotyledous stem by the

a) Xylem parenchyma b) Secondary phloem c) Endodermis d) Cambium

8. The increase in the width of blood vessels the mammalian skin at high temperature known as

a. Constriction b. Vasodilation c. sweating d. excretion

9. The genotypic ratio of 1:2:1 in the offspring of a hybrid cross illustrates the law of

a. use and disuse b. dominance c. segregation d. variating

Answer Key

1. D 2. - 3.A 4.A 5.D

6.A 7.D 8.B 9. D. 9.D

Explanation to the Answers

1. Population density is the average number of individuals of a species per unit area of the habitat (D).
2. No correct Option. Nitrosomonas first convert ammonia to Nitrites (NO₂) while Nitrobacter completes the conversion to Nitrates (NO₃)
3. The middle ear consists of the eardrum (tympanium) and three small bones called ossicles which are malleus (Hammer), incus (anvil) and stapes (stirrup) in that order, that function in transmitting vibration. Stapes then link up with fenestral ovalis (A).
4. Cell membrane envelops the cytoplasm (A).
5. Golgi body is a stack of flat, membrane — bounded sacs. These protein filled sacs migrate to the surface of the cell and discharge their contents to the outside (D).
6. In moss plant, which exhibits alternation of generation. The sexual organ is called haploid gametophyte and asexual organ called diploid sporophyte. (A).
7. In the dicotyledon roots and stems, cambium exists between the xylem and the phloem. They are capable of living and multiplying thereby xylem and phloem. This then results in the growth in width or growth of the stem called secondary thickening (D).
8. The mechanism is to increase the rate of heat loss to the environment during dry season (B).

UNIVERSITY OF ILLORIN 2008 POST UME TEST - BIOLOGY

1. During the process of starch formation in the leaves, the oxygen given off is derived from
a. Sunlight b. Chlorophyll c. carbon dioxide d. Water.
2. Which of the following organs regulates the amount of amino acids and glucose in the body?
a. Liver b. Kidney c. Pancreas d. Spleen
3. When two organisms heterozygous for a trait are made to cross, the phenotypic ratio of the offspring produced will be

- a. 2:1 b. 1:2:1 c. 3:1 d. 1:2
4. Glycolysis is best described as
a. Splitting of glucose in the presence of oxygen
b. Fermentation of starch
c. Splitting of glucose in the absence of oxygen
d. Formation of carbon dioxide and water from glucose
5. Which of the following is not true?
a. Inhaled air contains more carbon dioxide than exhaled air
b. Exhaled air contains more carbon dioxide than inhaled air
c. Exhaled air is warm and contains water vapour
d. Movement of diaphragm aids respiration.
6. Partially digested food ready to leave the stomach is referred to as
a. Curd b. Chyme c. Glycogen d. Roughage
7. Mosses, Liverworts and ferns can be grouped together because they
a. are all aquatic plants b. are grown in deserts
c. are seedless plants d. all produce colorless flowers
8. In Spirogyra, the pyrenoid
a. excretes waste products b. is mainly used for respiration
c. is used to store starch d. is suspended by cytoplasmic strands
9. Viruses are regarded as non — living because they
a. can neither reproduce asexually nor sexually
b. can not survive in their respective environments
c. do not possess characteristics transmissible from one generation to the next
d. can neither respire nor excrete.

ANSWER KEY

1.D 4. A 7. C

2.A 5.A 8. C

3.C 6.C 9. B

EXPLANATION TO ANSWER

1. $2H_2O \rightarrow 4H^+ + 4OH^-$

$4OH^- + \text{Chlorophyll} \rightarrow 2H_2O + O_2 + \text{Energy (D)}$

2. Kidney is an excreting organ and acts as osmo-regulators. Liver is a large organ lying under the diaphragm. One of the important functions of the liver is to regulate the amounts of substances passed into the general circulation.

Excess sugars are temporarily stored in the liver as animal starch or glycogen (A).

3. T t

T Tt Tt

t Tt tt

3 tallness: 1 shortness (C)

4. In the first stage of respiration, sugar is broken down, step by step, to pyruvic acid, a compound containing three carbon atoms. This sequence of reaction is known as glycolysis (A).

5. Human being inhaled air from the environment, the larger part of the air is oxygen and after different process (respiration), human being exhale gas which is majorly carbon dioxide (A).

6. The wall of the stomach are muscular and regular peristaltic movement chum up the food, mixing it thoroughly with the gastric juice. By the time it is ready to leave the stomach the food looks like a watery paste called CHYME (C).

7. They are seedless plants (C).

8. Pyrenoid is for starch storage (C)

9. Although they have no means of propelling themselves they can reproduce and have characteristics which are transmitted from one generation to the next. They can only replicate inside the living host (B).

UNIVERSITY OF ILLORIN 2009 POST UME TEST - BIOLOGY

1. In bird, the following feathers possess after shaft

a. Quill and filoplumes b. Down and filoplumes

c. Covert and down d. Quill and covert

2. The nutritive layer of the eye in mammals is

a. Refracting media b. Conjunctiva c. Cornea d. Sciara

3. Ultra filtration in the Kidney takes place in the

a. Bowman's Capsule b. Pelvis c. Loop of Henle d.

Proximal Convulated Tubule

4. Which of the following bones is not a component of the fore limb?

a. Olearanon b. Ulna c. Tibia d. Humerus

5. The condition in which the anthers mature before the stigma is called.

a. Protandry b. Epigyny c. Hypogyny d. Protogyny

6. In most true ferns, sporangia are grouped into

a. Indusium b. Fronds c. Son d. Prothalls

7. The ratio of carriers to sucklers in the F2 generation derived from a parental cross at two carriers of haemoglobin S gene is

a. 3:1 b. 1:3 c. 2:1 d. 1:2

8. In which part of a leguminous plant can bacteria like Azotobacteria be found ?

a. Spongy mesophyll b. Root nodes c. Stern internodes

d. Stem nodes

9. In a dicotyledonous stem, companion cells are found close to the

a. Endodermal cells b. Silver tubes c. Xylem vessels d.

Pericyclic fibres

10. The position occupied by an organism In a food chain is referred to as

a. Trophic level b. Niche level c. Energy level d. Feed

level

ANSWER KEY

1. C 5.A 8. B

2. - 6. B 9. B

3.A 7. C 10.A

4. C

EXPLANATION TO THE ANSWERS

1. The possession of feather is the most obvious difference between birds and other vertebrates. At the base of the vane, the barbules do not interlock and the barbs form a small tuft called the after shaft. Convert and down possession shaft (C).
2. The middle layer (choroid coat). Choroid is pigmented and contains many capillaries and it's the nutritive layer of the eye (no correct options).
3. It was found that the fluid in the capsular space has almost exactly the same composition as blood plasma means the plasma proteins. It seems that the capsular fluid is formed by a process of ultra — filtration from 'the glomerular capillary (i.e Ultra — filtration takes place in the Bowman's capsule) (A)
4. Ulna and Radius articulate at the elbow with the humerus at the fore limbs. Tibia belongs to the hind — limbs (C).
5. In protandry, the stamens (Anthers) ripen first and shed their pollen before the stigma is matured (A).
1. At certain seasons, large number of spore — bearing bodies (sporangia) appear on the under surface of mature fronds. At first, these are green, but they become brown as they mature. The sporangia are gathered into groups over the veins. Each group is called a sorus and each has a cover called an Indusium (B).
2. A S
A AA As
S As SS
The ratio of carrier (AS) to Sucker is 2:1 (C).
8. Azobacter is found at the root nodules of Leguminous plant (B).
9. Companion cells are narrow cells densely filled with cytoplasm. There is one beside each sieve tube (B).
10. A food chain shows the transfer of energy and nutrients from organism to organisms in a feeding pathway. A food chain involves at least two links and more organisms at the lower trophic level to the higher trophic level (A).

UNIVERSITY OF ILLORIN

2009 POST UME TEST

USE OF ENGLISH

Instruction: Read the passage below and answer the question that follows

Epilepsy is a condition in which the patient is subject to recurrent attacks of loss of consciousness. Known as 'fits' on-losing consciousness, the patient falls and may hurt himself, and though in some cases the fit may end at this point, most attack go on to a stage in which the muscle on the body became rigid and the breathing is interrupted. This in turn is usually followed by the convulsive stage, in which there are jerking movements of the head, limbs and hand. The tongue may be bitten and the patient's writhing, irregular breathing, starring eyes and blue lips may be very alarming to the spectator. Then the patient slowly recovers, though when consciousness is fully restored the patient is still in a weakened condition and suffers unpleasant after-effects. Onlookers often insist on calling an ambulance but this is unnecessary. The patient should be made as comfortable as possible and allowed to rest.

Questions:

1. As used in the passage, the word convulsive' is a/an
a. nominal phrase b. adjective c. gerund d. Preposition
2. The word, 'after-effects' in the fifth sentence of the passage is an example of
a. compound noun b. adjective c. gerundial marker d. prepositional phrase
3. The word, 'spectator 'can also be used in the context of
a. sport b. academics hospital interaction d. dancing

Section B

Instruction: Choose the correct option to fill the gap from the list under each of the sentences

4. Sales _____ during the festival period
a. peeked b. peacked c. picked d. peekid
5. It is only a fool that suffers in the _____ of the plenty
a. mist b. midst c. midct
6. We promised _____ to make
a. amend b. amend c. amends d. a mends
7. The man divided the job between you and
a. 1 b. myself c. me d. myself

Instruction From the words or groups of words letter A-D, choose one which is mostly nearly opposite in meaning to the under listed expression as it is used in each of the following sentences:

8. Alhaji Taju Ologbenla is a prosperous businessman
a. unsuccessful b. unskillful unscrupulous d. unskilled
- 9 All the must pass the compulsory subject
a. Unimportant b. optional c. unreliable d. inferior
10. The security man acted courageously when thieves attacked the bank,
a. indiscreetly b. fearlessly c. shyly d. timidly" instruction:

ANSWER KEY

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

UNIVERSITY OF ILLORIN

2010 POST UME TEST - USE OF ENGLISH

1. The man who killed the dog is here. The underlined in the above sentences is an example of
(a) A phrase (B) A clause (c) an adjective (D) adverbial phrase

From the words letter A-D, choose the options that best complete the sentences.

2 The man acceded _____ the Child's demands
(a) for (b) in (c) of (d) to

3. The weather was accurately
(a) guessed (b) forecasted (c) fore cast (d) predicted

From the list of words or group of words lettered A to D below, choose the word or group of words that the sentences.

4. The polices man stopped all the _____ to check and arrest all tax defaulters.

(a) passer — by (b)passers — by (c) passer — byes (d) passer — byes

Pick the words that are opposite in meaning to the underlined expressions as used in these sentences.

5. The team played a lack luster game
(a) dull (b) brilliant (c) enthusiastic (d) timid

6. Grandma is known to be ponderous
(a) snobbish (b) instinctive (c) impulsive (d) gentle

(Use the short passage below to answer Question 7.

The word "paragraph" means writing ordinary or drawing with light. Therefore, a picture is one drawn with rays of light.

Essentially, the camera box is a box with an aperture at one end of it .The aperture allows high into the camera box as a window does for a room

7. The percentage representation of nouns in the above passage

(a) 19% (b)32% (c)44% (d) 14%

8. An adjective is always positioned

(a) after prepositions (b) before the noun

(c) after the noun (d) at the beginning of a sentences

9. The logical arrangement of sentences in a paragraph is known as

(a) clarity (b)completeness (c) coherence (d) unity

10. The word class comprises of the following except

(a) prepositions (b) phrases (c) pronouns (d) demonstrative

ANSWER KEY

1. A 2. D 3 C 4 B 5 C 6C

7. C 8 B 9 C 10 D

UNIVERSITY OF ILLORIN 2010 POST UME TEST - BIOLOGY

1. All these are components of blood except

a. Plasma b. Erythrocytes c. Leucocytes d. Fibrin

2. When the F1 of a cross between two parents with pair of contrasting characters is selfed, the F2 population segregates approximately in a ration of

a. 2:1 b. 1:1 c. 1:2 d. 3:1

3. The specific role played by an organism in its environment is known as.

a. its function b. its responsibility c. Ecologicalniche d. its expected role

4. Which of these is a common property of cell ecosystems?

a. flow of energy b. decomposition of organic matter

c. Energy flow and nutrient cycling d. presence of plants and animals

5. Darwin theory of evolution explains the origin of species based on the existence of --

a. Variations b. Dominant characters c. Genes d.

Acquired characters

6. All these are true about chloroplast and mitochondria except

a. they both have inner membrane reticulations

b. they both have their own DNA's

c. They are double membrane organelles

d. they are found in plant and animal cells

7. The following structures are used for breathing in toad except

- a. Buccal cavity b. Lung c. Skin d. alimentary system

ANSWER KEY

1.D 2.D 3.C 4.D 5.B 6.D 7.D

EXPLANATIONS TO THE QUESTIONS

1. Erythrocytes, Leucocytes and plasma are all components of blood but there is a fascinating process in which more than 12 — different chemical factors present in the blood bring about the conversion of the soluble plasma protein fibrinogen into a mesh work of fine fibres called Fibrin (D).

2. (3:1) (D)

T t

T Tt Tt

t Tt tt

3. Niche is a place which is suited to the way of life of an organism within a community herbivore and a carnivore may share habitat but their different feeding methods means that they occupy different niches (C)

4. Ecosystem is an ecological unit made up of a community of all plant and animals living in a habitat and thenon — living part of the environment (D).

5. Charles Darwin is most closely associated with the theory of evolution Darwin has an unparalleled opportunity to explore the flora and fauna in many different part of the world. During his long voyage, Darwin was forced further towards the conclusion that animals and plants have evolved by a process of slow and gradual change over successive generation. (B).

6. Chloroplast is absent in animal cell (D).

7. Toad exchange gas through lung, skin and buccal cavity. Alimentary system is involved in digestive system (D).

GENERAL KNOWLEDGE

1. Democracy day is celebrated in Nigeria on (a) Oct., 1 (b) Jan. 12 (c) May 29 (d) June 12.

2. The first Africa country to host FIFA world cup is (a) Nigeria (b) Egypt (c) Morocco (d) South Africa

3. How many members make up house of Representative in Nigeria?

(a)270 (b) 109 (c) 360 (d) 35.9

4. How many members make up senate in the upper arm of the house of assembly?

(a) 100 (b) 108 (c) 109 (d) 110

5. Into how many geopolitical zone is Nigeria divided?

(a) 4 (b)5 (c) 6 (d) 7

6. After recapitalization of banks in Nigeria, the number of banks become

(a)21 (b) 22 (c) 25 (d) 24

7. Abuja became Nigeria Federal capital territory

(a) 1991 (b) 1990 (c) 1989 (d) 1988

8. The motion for self governance was moved in Nigeria by

(a) Chief Anthony Enahoro (b) Dr. Nnamdi Azikwe

(c) Chief Obafemi Awolowo (d) Alhaji Tafawa Balewa.

9. The newest state! country in Africa is

(a) Malawi (b) South Africa (c) Southern Sudan (d)

Sharawa Republic

10. When was Rosen Mubarak of EGYPT removed from office as president?

(a) Jan 2011 (b) Feb. 2011 (c) March, 2011 (d) April, 2011

11. The first civilian president that died in office in Nigeria is

(a) Sir Tafawa Balewa (b) Gen. Agunyi Ironsi

(c) Gen Murtala Mohammed (d) Alhaji Umar Yar'adua

12. Millennium development goals was grouped into how many points?
(a) 6 (b) 7 (c) 8 (d) 9
13. Who was the first Military head of state in Nigeria?
(a) Gen. Olusegun Obasanjo (b) Gen Murtala Mohammed
(c) Gen. Agunyi Ironsi (d) Gen Ibrahim Babangida
14. Umar Musa Yar'adua governance was anchored on
(a) 8 point agenda (b) 7 points agenda (c) 6 point agenda (d) 10 point agenda
15. How many local government is in Nigeria?
(a) 774 (b) 744 (c) 784 (d) 794
- 16 Who is the First female president in Africa?
(a) Hon. Olubunmi Ete (b) Chief (Mrs.) Funmilayo Kuti
(c) Dr.(Mrs.) Ngozi Ewenla (d) Mrs. Ellen Johnson Sirleaf
17. Nigeria flag was designed by
(a) Mr. Ama Onabolu (b) Prof Wole Soyinka
(c) Prof Chinua Achebe (d) Mr. Taiwo Akinkunmi.
18. 2010 CAF African footballer of the is awarded to
(a) Samuel E'to of Cameroun (b) Dj Drogba of Cote D'Ivoire
(c) Mikel Obi of Nigeria (d) Gyan of Ghana.
19. What is the currency of India?
(a) Rupees (b) Dollar (c) Pounds sterling (c) Cfan (d) Naira.
20. Coal is mined in LLLLLin Nigeria.
(a) Jos (b) Enugu (c) Oloibiri (d) Igbeti.

ANSWER KEY

- 1.C 6 C 11 D 16 D
2.D 7 A 12 C 17 D
3.C 8 A 13 C 18 A
4.C 9 C 14 B 19 A
5.C 10.D 15 A 20 B

SECTION B

1. What natural product has been used as means of exchange long time?

- (a) money (b) Dollar (c) Salt (d) Cowry
2. How many of the earth surface in percentage is covered with water?
(a) 10% (b) 29% (c) 50% (d) 71%
3. How much of the earth surface (including the rocks, mountain, valley and other physical features) in percentage is covered with land?
(a) 10% (b) 29% (c) 50% (d) 71%
4. What is the smallest planet in our solar system called?
(a) mercury (b) mars (c) Venus (d) earth
5. Which language is spoken in Sicily?
(a) Spanish (b) English (c) Italian (d) Latin
6. What is the name of the famous mountain in Rio de Janeiro! Brazil
(a) Salt loaf mountain (b) Sugar loaf mountain (c) Sand mountain (d) marble mountain
7. What is the speed of light?
(a) 3×10^9 m/s (b) 3×10^8 m/s (c) 3×10^5 m/s (d) 3×10^6 m/s
8. Which continent is largest on earth?
(a) Africa (b) Europe (c) Asia (d) Australia
9. How many months of the year have 31 days?
(a) 6 (b) 7 (c) 8 (d) 9
10. What are people who do not eat protein from animal called?
(a) Omnivorous (b) Carnivorous (c) vegetarian (d) vegetis
11. From where is the Olympic fire sent out to the Olympic games every 4 years?
(a) Abuja (b) Greece (c) Washington D.C (d) United Kingdom
12. How many edge has a cube?
(a) 4 (b) 9 (c) 12 (d) 16

13. Which Continent has the coldest climate?
(a) Antarctica (b) Africa (c) Europe (d) Asia
14. Which mountain range separate Europe from Asia?
(a) The Kiliimanjaro (b) Everest (c) The Urais
(d) Uranium
15. What does the word "EMIR" means?
(a) king (b) royalty (c) Prince in Arabic (d) Throne
16. Which channel connect the Atlantic ocean with the
pacific ocean?
(a) Banana channel (b) panama channel (c) Palima
channel (d) oceanic channel
17. When was telephone first invented?
(a) 1860 (b) 1861 (c) 1862 (d) 1862
18. Who invented the first telephone?
(a) Charles Darwin (b) Phillip Reis (c) Einstein (d)
Michael Faraday
19. Cairo is the capital of which country.
(a) Morocco (b) Egypt (c) Tunisia (d) Libya
20. Lima is the capital of which country
(a) Peru (b) China (c) Chile (d) Mexico
21. Barometer is used to measure
(a) the atmospheric air (b) the atmospheric pressure
(c) temperature (d) volume
22. At which temperature will pure water be
transformed to steam
(a) 90° C (b) 100° C (c) 110° C (d) 115° C
23. What is a skyscraper?
(a) a mountain (b) a bird (c) a very high building (d) a
tall tree
24. Which is the smallest continent?
(a) Australia (b) Africa (c) Artic & Arctatical (d) Africa
25. Which of the following gases is used to fill balloon?
(a) Oxygen (b) carbon IV oxide (c) Helium (d) Nitrogen

26. The election into the National assembly, already
schedule to hold on the 2 April, 2011 was shifted to
(a) 4th April (b) 5th April (c) 7th April (d) 9th April
27. Dr. Goodluck Jonathan was sworn in as the acting
president in Nigeria on the . . .
(a) 10th Feb., 2010 (b) 11th feb., 2010 (c) 12th feb., 2010
(d) 13" Feb., 2010
28. Which country is hosting 2014 world cup?
(a) USA b) Argentina c) Brazil (d) Germany
29. Who is the INEC chairman for the 2011 general
election?
a) Prof. Maurice Iwu b) Prof Wole Soyinka
c) Prof. Attairu Jega d) Prof Chinua Achibe
30. Who was the senate president from June 2007 to
June 2011 in Nigeria upper legislative chamber?
(a) David Mark (b) Dimeji Bankole (c) Ike Ekeremadu
(d) Alhaji Nafada

ANSWER KEY

- 1 C 6 B 11 B 16 B 21 B
2 D 7 B 12 C 17 B 22 B
3. B 8 C 13 A 18 B 23 C
4 A 9 B 14 C 19 B 24 A
5 C 10 D 15 C 20 A 25 C
26 D 27C 28 C 29 C 30.A

SECTION C

1. The vice-president in Nigeria between 1979-1983 is
(a) Dr. Joseph Wayas (b) Dr. Alex Ekwueme
(c) Alhaji bashiru Tofa (d) Chief M.K.O Abiola
2. A principle that advocate total equality of members
of a society is called...
(a) Communalism (b) egalitarianism (c)
Totalitarianism (d) Oligarcy

3. The governor of old western region who died in a military coup with the visiting head of state in 1966 was
(a) Lt. Col. B. S. Dimka (b) Col. Shittu Alao
(c) Lt. Col. Adekunle Fajuyi (d) Col. Ibrahim Taiwo
4. The popular means of transportation during the trans-Sahara trade was the
(a) donkey (b) horse (c) camel (d) mule
5. Which was the general purpose currency in pre-colonial Nigeria?
(a) cloth (b) salt (c) copper (d) cowry
6. General Murtala Muhammad was assassinated in a coup led by
(a) Lt. Col. Kaduna Nzeogwu (b) Col. Joe Garba
(c) Lt. Col. B.S. Dimka (d) Major Gideon Orkar
7. The twenty one state structure came into being in Nigeria during the rule of
(a) Gen. Murtala Muhammad (b) Major Gen. Agunyi Ironsi
(c) Gen. Olusegun Obasanjo (d) Gen. Ibrahim Babangida
8. The colony of Lagos and protectorate of southern Nigeria were amalgamated to become the colony and protectorate of southern Nigeria in...
(a) May 1900 (b) May 1902 (c) May 1905 (d) May 1906
9. The first African and only Nigerian to win nobel prize in Literature is
(a) Prof. Chinua Achebe (b) Chris Okigbo
(c) Prof. Wole Soyinka (d) Prof. Akinwumi Ishola
10. How many Rivers is in Africa?
(a) 6 (b) 7 (c) 8 (d) 9
11. Civil war broke out in Nigeria on
(a) Jan., 1967 (b) Feb., 1967 (c) May, 1967 (d) July, 1967
12. What is the third planet of the solar system?
(a) mercury (b) Mars (c) earth (d) venus
13. The solar system is made up of how many planets.

- (a) 10 (b) 9 (c) 8 (d) 7
14. What is the capital of Gombe state in Nigeria?
(a) Goje (b) Gombe (c) Dutse (d) Damaturu
15. When was Ekiti state established?
(a) 1990 (b) 1991 (c) 1995 (d) 1996
16. According to 2006 Censure, which state is the most populous in Nigeria?
(a) Oyo (b) Kano (c) Lagos (d) Kaduna
17. Where is marble mined in Oyo state?
(a) Igbebi (b) Igboho (c) Iseyin (d) Ogbomoso
18. Which of these is a tourist centre in Ogun state?
(a) Obudu cattle Ranch (b) Ikogusi water fall (c) Olumo Rock (d) Gurara water fall
19. Nigeria is boundaries in the North by which of the following countries.
(a) Cotonu (b) Ghana (c) Cameroun (d) Niger
20. The first election in Nigeria was held in the year
(a) 1914 (b) 1922 (c) 1948 (d) 1960

ANSWER KEY

1. B 6 C 11 D 16 B
2. B 7 A 12 C 17 A
3. C 8 D 13 B 18 C
4. C 9 C 14 B 19 D
5. D 10. B 15. D 20 B

SECTION D

1. River Niger takes its source from
(a) mountain Everest (b) Futa Jalon (c) Kilimanjaro (d) Olumo rock
2. From Which country does River Niger takes its source?
(a) Ghana (b) Niger (c) Cote D'Ivoire (d) Guinea
3. How many days make a leap year? (a) 362 (b) 364 (c) 365 (d) 366

4. How many hours does it take for the earth to rotate on its own axis?
(a) 7 hr (b) 12 Hr (c) 24 hr (d) 36 hr
5. The last eclipse of the sun in Nigeria was observed on
(a) 29th march, 2006 (b) 28th march, 2006 (c) 30th march, 2006 (d) 27th march, 2006
6. Dr. Goodluck Jonathan was sworn in as executive president on
(a) 1 May, 2010 (b) 2 May, 2010 (c) 5th May, 2010 (d) 6th May, 2010
7. Alhaji Umar Yar'adua died in office on...
(a) 1st May, 2010 (b) 2nd May, 2010 (c) 5th May, 2010 (d) 6th May, 2010
8. The first country to witness Oyster in North- Africa in 2011 is
(a) Egypt (b) Tunisia (c) Libya (d) Morocco
9. The first multi-storey building in Nigeria was built in
(a) Lagos (b) Abuja (c) Kano (d) Ibadan
10. The Premier University college was established in Nigeria in the year.
(a) 1960 (b) 1947 (c) 1948 (d) 1949
11. The first television station in Africa, WNTV, was established in the year
(a) 1959 (b) 1960 (c) 1963 (d) 1966
12. Who stopped the killing of twins in Calabar?
(a) Henry Townsend (b) Mary Slessor (c) Mongo Park (d) Herbert Macaulay
13. English language Bible was translated to Yoruba Language by...
(a) Bishop Adedokun (b) Bishop Finn (c) Bishop Ajayi Crowther (d) Cannon Sunday Makinde
14. LLL. is referred to as confluence town in Nigeria.
(a) Lokoja (b) Lagos (c) Port Harcourt (d) Abuja
15. Nigeria is boundaries in the south with
(a) Pacific ocean (b) Atlantic ocean (c) Red sea (d) Arctic & Antarctic
16. How many political parties participated in the 2011 general election ?
(a) 62 (b) 63 (c) 64 (d) 65
17. LL.. is the leader of the first military coup in Nigeria.
(a) Col. Emeka Ojukwu (b) Major Chukwuma Nzeogwu (c) Gen. Olusegun Obasanjo (d) Gen Yakubu Gowon
18. The basis for Nigeria's membership of the commonwealth is LLL.
(a) She was a former colony of Britain
(b) She was a leading opponent of Apartheid in South Africa
(c) She is the most populous black nation
(d) She provides athletes for the common wealth.
19. Which of the following is not an interest group?
(a) Christian Association of Nigeria (b) Nigerian Medical Association
(c) Catholic church (d) Pentecostal fellowship of Nigeria
20. A legislative debate or proceeding which is attended by all members of the house is called LL..
(a) Plenary session (b) Recess session
(c) committee stage/ session (d) Third Reading session

ANSWER KEY

1. B 6 D 11 A 16 B
2. D 7 C 12 B 17 B
3. D 8 B 13 C 18 A
4. C 9 D 14 A 19 C
5. A 10. C 15 D 20 A

SECTION E

1. During the period of 1960-1966, Nigeria was governed under the:
(a) Presidential system of government (b) Westminster system of Government

- (c) Con –federal system of government (d) Unitary system of government
2. Which of the following in the Sokoto caliphate performed functions similar to that of the Bashorun in Oyo kingdom?
(a) Waziri (b) Galadima (c) Ma'aji (d) Alkali
3. In the Igbo political system, the most senior member of the council of elder is the
(a) Okpara (b) Obi (c) Eze (d) Ofo
4. Herbert Macaulay was the first president of
(a) NCNC (a) AG (c) UMPC (d) NEPU
5. Equality before the law is a component of
(a) Separation of power (b) checks and balances (c) The rule of law (d) constitutional law
6. Adolf Hitler is to Nazism as Benito Mussolini is to
(a) Feudalism (b)communism (c) Fascism (d) Socialism
7. Nigeria became a republic on
(a) May 29, 1999 (b) Oct. 1,1960 (c) Jan. 15,1966 (d) Oct. 1, 1963
8. The Economic Community of West Africa states was established in
(a) May 1975 (b) May 1963 (c) May 1966 (d) May 1996
9. The first Indigenous Governor —General of Nigeria is
(a) Donald Cameron (b) Sir Ames Robertson (c) Sir Adesoji Aderemi (d) Rt. Hon. Nnamdi Azikwe
10. Free-Education was introduced in western Region by which of these Premier?
(a) Chief Obafemi Awolowo (b) Chief S. L Akintola (c) Chief Michael Adegunle Ajasin (d) Chief Bola Ige
11. The EFCC was established to
(a) arrest & try corrupt politician (b) combat economic and financial crimes in Nigeria (c) arrest, detain & prosecute corrupt state governors and legislators (d) assist the world in monitoring economic project in Nigeria
12. In many countries, citizenship can be acquired through the following process except
(a) Nationalization (b) Naturalization (c) Registration (d) Birth
13. The following are Anglophone West Africa countries except
(a) Ghana (b) Nigeria (c)Kenya (d) The Gambia
14. Every political system performs the following basic function except
(a) Rule making (b) Rule transformation (c) Rule enforcement (d) Rule adjudication
15. The amalgamation of the Northern and Southern protectorates and the colony of Lagos was in
(a) 1960 (b) 1966 (c) 1963 (d) 1914
16. Globalization is all but except one of these . .
(a) a renewed concept in international studies (b) limited to the west (c) a process of making the world smaller (d) an increasing integration of the world
17. The centenary anniversary of the amalgamation of Northern and Southern Nigeria will be established in
(a) 2060 (b) 2066 (c) 2064 (d)2014
18. The second military coup d'état in Nigeria took place on
(a) Jan. 15, 1966 (b) Oct. 1, 1966 (c) July 29, 1966 (d) July 29, 1975
19. The idea of democracy stated with the
(a) Romans (b) British (c) Greeks (d) Egyptian
20. The first political party in Nigeria was established in
(a) 1923 (b) 1922 (c)1951 (d) 1979
22. Under the military regime in Nigeria, state enactment are known as

(a) laws (b) decrees (c) edicts (d) promulgation (e) proportion

23. The motto of Boys' Scout is

(a) be faithful (b) be prepared (c) be inspired (d) be serious (e) be helpful

24. Which state is referred to as 'power state' (a)

Bayelsa (b) Delta (c) Niger (d) Federal capital territory (e) Kaduna.

ANSWER KEY

1 B 6 C 11 B 16 B 21 B

2 A 7 D 12 C 17 D 22 B

3. D 8 A 13 C 18 C 23 B

4 A 9 C 14 C 19 C 24 C

5 C 10A 15 D 20 B

UNIVERSITY OF ILLORIN 2006 POST UME TEST

1. A solid weighs 0.040N in air and 0.024N when fully immersed in a liquid of density 800kgm. Calculate the volume of the solid ($g = 10\text{ms}^{-2}$)

(a) $2.0 \times 10^{-6}\text{m}^3$ (b) $2.5 \times 10^{-6}\text{m}^3$ (c) $3.0 \times 10^{-6}\text{m}^3$ (d) $2.0 \times 10^{-6}\text{m}^3$

2. A body of mass 5kg starts from rest and is acted upon by a force 100N, the acceleration in ms^{-2} and final velocity after 10secs will be

(a) 20ms^{-2} , 20ms^{-1} (b) 25ms^{-2} , 250ms^{-1} (c) 20ms^{-2} , 200ms^{-1} (d) 10ms^{-2} , 300ms^{-1}

3. All these are true about impulse except

(a) change in momentum of a body (b) its unit is Ns (c) product of force and time (d) change in acceleration of a body

4. A car of mass 100kg moves at a constant speed of 20m/s along a horizontal road where the friction force is 200N. Calculate the power developed by the engine.

(a) 2000 watt (b) 3000 watt (c) 4000 watt (d) 5000 watt

5. According to Newton's second law of motion:

(a) momentum is proportional to force action (b) action is equal to reaction but in the opposite direction

(c) impulse force is inversely proportional to time

(d) force is proportional to rate of change of momentum

6. The weight of heat energy needed to freeze one kilogramme of milk at the inversely point is known as

(a) heat energy (b) latent heat of fusion (c) specific latent heat of fusion (d) specific heat capacity

7. In a certain process 12,000 calories of Hexane is supplied to the system while the system does work 7500J. Find the change in internal energy: Note $1\text{cal} = 4.184\text{J}$

(a) 57,708J (b) 42,708J (c) 35,208J (d) 50,208J

8. Some water is heated in a pot. The major mode(s) of the heat transfer through the water is/are by:

(a) convection (b) conduction (c) radiation (d) conduction and radiation

9. Calculate the quantity of heat required to completely convert 20kg ice at 0°C of water at the same temperature (specific latent heat of fusion of ice = 336Jkg^{-1})

(a) 8.06KJ (b) 706KJ (c) 538KJ (d) 6.72KJ

10. An object of mass 10g requires 20J of heat energy to change its temperature by 20°C . Calculate the specific heat capacity of the object. (a) $0.1\text{Jg}^{-1}\text{K}^{-1}$ (b) $0.2\text{Jg}^{-1}\text{K}^{-1}$ (c) $0.4\text{Jg}^{-1}\text{K}^{-1}$ (d) 0

11. Which of these radiation does not originate with the nucleus?

(a) Alpha (b) x-rays (c) beta (d) neutron

12. A tyre is pumped to a pressure of 30Nm^{-2} at 27°C , when the tyre rates up to 54°C . Find the new pressure assuming no change in volume.

(a) 40.7Nm^{-2} (b) 60.0Nm^{-2} (c) 32.7Nm^{-2} (d) 52.6Nm^{-2}

13. An eclipse of the sun may occur when

(a) the sun passes between the moon and the Earth

- (b) the sun passes between the Earth and the sun
(c) the Earth passes between the moon and the sun
(d) the moon and the Earth rotate together
14. The shortest mirror in which a person. interest can see its entire image is
(a) 2m (b) 0.5m (c) 4m (d) 1m
15. The nature of the image formed by an object placed 12cm from a converging lens of focal length 18cm is
(a) virtual and magnified (b) virtual and real (c) a infinity (d) virtual
16. A erect image three times the size of the object is obtained from a concave mirror of radius of curvature 36cm, what is the position of the object from the mirror?
(a) 24cm (b) 12cm (c) 10cm (d) 8cm
17. The angle of deviation of light of various colours passing through a glass prism decrease in the order
(a) red, blue and orange (b) blue, red, orange (c) red, orange, blue (d) orange, blue, red
18. Two positive point charge of $12\mu\text{C}$ and $8\mu\text{C}$ respectively are 10cm apart. The work done in bringing them 4cm closer is ($K= 9 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$) (a) 600J (b) 300J (c) 6.8J (d) 518J
19. The effective capacitance of a system of capacitors arranged such that a $4\mu\text{F}$ capacitor is in series with $3\mu\text{F}$.
(a) $1.7\mu\text{F}$ (b) $3.0\mu\text{F}$ (c) $4\mu\text{F}$ (d) $5.0\mu\text{F}$
20. How long will it take to heat 3kg of water from 28°C to 88°C using an electric kettle, which taps 6A from a 210V supply? (a) 5.6 minutes (b) 9.6 minutes (c) 10.0 minutes (d) 19.3 minutes
21. A moving coil galvanometer has a resistance of 10Ω and a full scale deflection of 0.01A, it can be converted into a voltmeter of 10V full-scale deflection by connecting a resistor of
(a) 969 Ω parallel (b) 990 Ω parallel (c) 10 Ω parallel (d) 10 Ω parallel
22. A musical note is different from a noise in that the
(a) amplitude of a noise is greater than that of a musical note
(b) frequency of a musical note is regular while that of a noise is irregular
(c) wavelength of a musical note is longer than that of a noise
(d) frequency of a note is higher than that of a musical note
23. Any line or section through an advancing wave in which all the particles are in the same phase is called
(a) wave crest (b) wave trough (c) wave amplitude (d) wave front
24. Which of the following materials is the best absorber of x-rays/gamma?
(a) hydrogen (b) calcium (c) copper (d) lead
25. Thunder is usually heard some seconds after lighting is seen because
(a) sound and light travel in different media
(b) thunder occurs after lighting
(c) sound travel more slowly than light
(d) sound travels in the form of waves but light does not
26. If a source of sound is moving, a stationary listener will hear a sound of different frequency. This is called
(a) Doppler effect (b) resonance (c) refraction (d) diffraction of sound
27. The period of vibration of a wave of wavelength 30m moving at a speed of 300m/s
(a) 10s (b) 270s (c) 330s (d) 900s
28. The quality (timbre) of sound depends
(a) amplitude (b) frequency (c) harmonics (d) wavelength

29. Which of the following consist entirely of scalar quantities:

- (a) pressure, work and electric potential
- (b) force, momentum and distance
- (c) velocity, energy and impulse
- (d) mass, time and temperature

ANSWER KEY

1 A 7 A 13 C 19 A 25 C

2 C 8 A 14 A 20C 26 A

3 D 9 D 15 A 21 B 27 A

4 C 10 A 16 A 22 B 28 C

5 C 11 A 17 D 23 D 29 D

6 C 12 C 18 D 24 D

UNIVERSITY OF ILLORIN (2007) POST UME TEST - PHYSICS

1. A car accelerates from 3rns-1 to 100ms in 35s.

Calculate the acceleration of the car.

- (a) 2ms-2 (b) 3ms2 (c) 4ms2(d) 5ms-2

2. A body bf mass 2kg moves round a circle of' radius

2m with a constant speed of 165m/s. Calculate the

force toward the centre. (a) 40N (b) 50N (c) 80N (d)

100N

3. A girl of mass 65kg falls horn a bridge that 50m

above the water. Calculate her kinetic energy after

falling for 5 sees. (a) 1 125J (b) 28125J (c) 9375J (d)

812501

4. Which of the following is a mechanical wave?

- (a) micro wave (b) water wave (c) X-ray (d) infra-red

ray

5. The half-life of the radioactive substance of mass

100g is 30 minutes. What fractions of the original

mass are left over after 3hrs? (a) 3.125 (b) 6.25 (e)

1.5625 (d) 0.02563

6. Two resistors 12] and 8] are connected in parallel, if

the power developed in 12], resistor is 6w, determine

the power developed in 3.32 resistor. (a) 9w (b) 12w

(c) 16w (d) 24w

7. How long will a 60 wart element take to heat water

of mass 0.5kg at 300C to 900C. Neglect heat loss (S.H.

C. of water = 4200jkg-1K-1) (a) 350secs (b) 1260secs

(c) 2100secs (d) 1500secs

8. The critical angle of glass is 42°, the approximate

refractive index of this glass is

- (a) 1.50 (b) 1.38 (c) 1.80 (d) 2.30

9. Second harmonic motion of a string 1.5m long fixed

at both ends 80Hz.

The speed of transverse wave in the string is

- (a) 120ms (b) 120m/s (c) 2.12m/s (d) 102m/s

10. The echo produced when a motion is fire from a

ship some distance from cliff is heard 1.2 second.

Calculate the distance of the ship (if the velocity of

Sound in air = 330m/s)

- (a) 138m (b) 198m (c) 275m (d) 296m

ANSWERS KEY

1.B 2.A 3.D 4.B 5.C

6.A 7.C 8.A 9.B 10.D

UNIVERSITY OF ILLORIN 2008 POST UME TEST - PHYSICS

1. To what height will a missile find vertically upwards

with a speed of 28m/s attain if air resistance is

neglected? $g = 9.8\text{m/s}$

2. Which of the following is not an example of a

machine?

- (a) screw (b) lever (c) horizontal plane (d) pulley

3. How long will it take to heat 3kg of L1't from 28°C in

an electric kettle taking 6A from 220V supply?

(specific heat capacity of water is 4180J/k)

- (a) 2mins (b) 9mins (c) 10mins (d) 20mins

4. A cell with an emf of 1.5V and an internal resistance of 10.0ohms is connected to two resistances of 2.0 and 3.0 ohms in series. The current produced by this cell is
(a) 0.25A (b) 2.5A (c) 0.5A (d) 0.75A

5. Which of the following is not essential for the production of electron by thermionic emission?
(a) Tungsten target (b) Reflection plate (c) Fluorescent (d) Hot cathode

6. If an object moves with a constant speed round a circle, it has an acceleration which is

(a) constant in magnitude and varying in direction
(b) varying in magnitude and constant in direction
(c) constant in magnitude and direction

8. The density of a solid is 130gcm³ at the temperature of 25°C. Find the density at 150°C if the linear expansion of the solid is $2.0 \times 10^{-5}K^{-1}$.

(a) 21.90gcm³ (b) 9.021.90gcm³ (c) 12.9gcm³ (d) 20.521.90gcm³

9. A bullet leaves the barrel of a gun with a speed of 80ms⁻¹. If the barrel is 20m long. Find the acceleration of the bullet.

(a) 160ms⁻¹ (b) 40ms⁻¹ (c) 800ms⁻¹ (d) 1600ms⁻¹

10. Sound and water waves are classified as mechanical waves and they cannot be propagated in one of the following media

(a) air (b) water (c) steel (d) vacuum

UNIVERSITY OF ILLORIN 2009 POST UME TEST - PHYSICS

1. A 5kg at rest is acted upon by a force of 20N for 20 milliseconds. The increases in momentum final speed of the body respectively are

(a) 4Ns and 8Ns (b) 0.4Ns and 0.08Ns (c) 0.4Ns and 0.8Ns (d) 4Ns and 0.8Ns

2. A body throws a stone up to a height of 10m and catches it back. What is the displacement of the stone (assume the hand remains at the same level at throw and at catch)

(a) 10m (b) 20m (c) 30m (d) 0m

3. A body moves along a circular path with uniform angular speed of 0.6rads and at a constant speed of 3.0m/s.

Calculate the acceleration of the body towards the centre of the circle.

(a) 2.5m/s² (b) 5.4m/s² (c) 5.0m/s² (d) 1.8m/s²

4. Which of the following is a derived unit? (a) Newton (b) Kelvin (c) Kilogram (d) second

5. The change of the direction of a wave as a result of a change in the velocity of the wave in another medium is called. (a) Refraction (b) Diffraction (c) Interference (d) Polarization

6. Light of frequency $6.0 \times 10^{14}Hz$ travelling in air is transmitted through glass of refractive index 1.5.

Calculate the frequency of the light in the glass.

(a) $6.0 \times 10^{14}Hz$ (b) $4.0 \times 10^{14}Hz$

(c) $7.5 \times 10^{14}Hz$ (d) $9.0 \times 10^{14}Hz$

7. A 700 glass prism has a refractive index of 1.5.

Calculate the angle of incidence for minimum deviation

(a) 350 (b) 490 (c) 590 (d) 450

8. An object placed 12cm in front of a convex lens produces a virtual image of magnification 3.0. the focal length of the lens is (a) 9cm (b) 12cm (c) 18cm (d) 36cm

9. What is the average velocity of the molecules in a sample of oxygen at 1000C? the mass of oxygen is $5.3 \times 10^{-26}kg$? (a) 540m/s (b) 450m/s (c) 540m/s (d) 504m/s

10. A conductor has a diameter of 1.0mm and length 2.0mm, if the resistance of the material is

(a) $2.55 \times 10^5\Omega$

(b) $2.55 \times 10^2\Omega$

(c) $3.93 \times 10^{-5}\Omega$

(d) $3.93 \times 10^{-8}\Omega$

**UNIVERSITY OF ILLORIN 2010 POST UME TEST
MATHEMATICS**

- Solve for X if $43x - 2 = 26x = 1$
(a) 6,694 (b) 6,649 (c) 6,469 (d) 6,496
- A cylinder of base radius 4cm has a volume of 100cm^3 . Calculate its height.
(a) 1.99cm (b) 9.19cm (c) 9.91cm (d) 10cm
- Find the real value of x for which $\sin hx = 1.475$
(a) 1.8108 (b) 1.0881 (c) 1.1808 (d) 1.1081
- If $4r^3 / 3 = 128.1$, then what is $4r^2$?
(a) 132 (b) 123 (c) 213 (d) 321
- Solve the polynomial $x^3 + 4x^2 + x - 6 = 0$
(a) 0, -1, 2 (b) -2, 4, 5 (c) 1, -3, -4 (d) 0, 1, 2
- The sides of a Rhombus are 4.2cm each. One of its angle is 58° . Calculate the lengths of the diagonals.
(a) 4.07, 7.34 (b) 4.70, 7.34 (c) 4.34, 7.07 (d) 4.70, 7.43
- Calculate the mean, median and mode of 2, 3, 3, 3, 5.
(a) 3,2,3,2 (b) 3,2,3,3 (c) 2,3,3,3 (d) 3,2,2,3
- Solve for x in the equations $6x + 4y = 5$ and $3x + 2y = 5$
(a) $x = 0$ (b) $x = 2$ (c) $x = 5$ (d) No solution
- Let $y = \log x$, calculate dy / dx
(a) $1 / \sin x$ (b) $1 / x^2 \ln a$ (c) $1/2x \ln a$ (d) $1 / x \ln a$
- Evaluate (2) if $(x) = \sin 45x^2 - 2$
(a) 2 (b) . (c) undefined (d) 0

SOLUTION

- $43x - 2 = 26x = 1$
Taking the logarithm of both sides
 $(3x - 2) \log 4 = (x + 1) \log 26$
 $3x \log 4 - 2 \log 4 = x \log 26 + \log 26$
 $3x \log 4 - x \log 26 = \log 26 + 2 \log 4$
 $x (3 \log 4 - \log 26) = \log 26 + 2 \log 4$
dividing both sides by $3 \log 4 - \log 26$

- $$x = \frac{\log 26 + 2 \log 4}{3 \log 4 - \log 26}$$
- $$= \frac{1.4150 + 2(0.6021)}{3(0.6021) - 1.4150}$$
- $$= \frac{2.6192}{0.3913} = 6.6914 \text{ (A)}$$
- The volume (V) of a cylinder with base radius (r) 2h
 $V = 100\text{cm}^3$, $r = 4\text{cm}$, $h = 7$
 $100 = \frac{22}{7} \times 16 \times h$
 $\Rightarrow h = 10 \times 7$
 22×16
 $= 1.99\text{cm} \text{ (A)}$
 - Recall that, $\sin hx = e^x - e^{-x}$
 $\therefore e^x - e^{-x} = 1.475$
Multiply both sides by 2, we have
 $e^x - e^{-x} = 2.95$
Multiplying through by e^x
 $e^{2x} - 1 = 2.95e^x$
 $\Rightarrow e^{2x} - 2.95e^x - 1 = 0$
Put $e^x = p$ LLL. (*)
 $\Rightarrow p^2 - 2.95p - 1 = 0$
Using general formula for solving quadratic equation
 $\frac{-(-2.95) \pm \sqrt{(-2.95)^2 - 4 \times 1 \times (-1)}}{2 \times 1}$
 $\Rightarrow p = 3.2571 \text{ or } -0.3071$
when $p = -0.3071$ we have from (*) that
 $e^x = -0.3071$. This is not possible since exponential function is non negative.
When $p = 3.2571$, we have from (*) that
 $e^x = 3.2571$
 $\Rightarrow x = \log_e (3.2571) = \ln 3.2571$
 $= 1.1808 \text{ (C)}$

$$r^3 = 3 \times 128.1$$

$$4 \times 22$$

$$= 3.13$$

(B)

$$5. x^3 + 4x^2 + x - 6 = 0$$

$$\text{Let } P(x) = x^3 + 4x^2 + x - 6$$

$$\text{Now, } P(1) = 1 + 4 + 1 - 6 = 0.$$

Hence, $x-1$ is a factor of $P(x)$

by factor theorem.

$$x^2 + 5x + 6$$

$$x - 1 \quad x^3 + 4x^2 + x - 6$$

$$x^3 - x^2$$

$$5x^2 + x$$

$$5x^2 + x$$

$$6x - 6$$

$$6x - 6$$

$$x^2 + 5x + 6 = x^2 + 2x + 3x + 6$$

$$= (x+2)(x+3)$$

$$\therefore x^3 + 4x^2 + x - 6 = 0$$

$$\Rightarrow (x-1)(x+2)(x+3) = 0$$

$$\Rightarrow \text{either } x - 1 = 0 \text{ or } x + 2 = 0$$

$$\text{or } x + 3 = 0$$

$$\therefore x = -3, -2, 1$$

1st diagram

$$\text{If } \angle A = 58^\circ, \text{ then } \angle C = 180^\circ -$$

$$58^\circ = 122^\circ$$

$$c^2 = b^2 + d^2 - 2bd \cos C$$

(cosine rule)

$$= 422 + 4.22 - 2 \times 4.2 \times 4.2 \cos 122^\circ$$

$$= 7.34 \text{ cm}$$

$$b^2 = a^2 + c^2 - 2ac \cos B \text{ (cosine rule)}$$

$$b^2 = 422 + 4.22 - 2 \times 4.2 \times 4.2 \cos 58^\circ$$

$$= 18.7$$

$$= 4.07 \text{ cm}$$

\therefore The lengths of the diagonals are 4.07 cm and

7.34 cm (A)

$$7. \text{ Mean} = \frac{2+3+3+3+5}{5}$$

$$= 3.2$$

$$\text{Median} = 3;$$

$$\text{Mode} = 3 \text{ (B)}$$

$$8. 6x + 4y = 5 \text{ LLLLL.. (i)}$$

$$3x + 2y = 5 \text{ LLLLL... (ii)}$$

Equations (i) and (ii) are parallel lines since

$$6x + 4y = 2(3 + 2y).$$

Therefore, there is no solution (D)

$$9. y = \log_a x$$

$$\Rightarrow y = \log_a x$$

$$\log_a e^y$$

$$\Rightarrow y \log_a e = \log_a x$$

Differentiating through with respect to x

$$\log_a e \frac{dy}{dx} = \frac{1}{x}$$

$$\Rightarrow \frac{dy}{dx} = \frac{1}{x \log_a e} = \frac{1}{x \ln a} \text{ (D)}$$

$$x^2 - 2$$

$$= \sin 90^\circ = 1 \quad 4 - 2 \quad 2 \text{ (B)}$$

UNIVERSITY OF ILLORIN
2006 POST UME TEST
MATHEMATICS

- If two graphs $y = px^2 + q$ and $y = 2x^2 - 1$ intersect at $x = 2$, find the value of p in terms of q .
 (a) $7-q$ (b) $q - 8$ (c) $8 - q$ (d) $7+ q$
- Interval years 10 12 13 15 16 18 19- 20 21 23
 No. of pupils 6 14 15 10 5
 The table above shows the frequency distribution of the ages (years) of pupils in a certain Sunday School. What percentage of the total number of pupils is over 15 years but less than 21 years?
 (a) 60% (b) 50% (c) 45% (d) 35%
- $-1 -1 -1$
 Evaluate $3^1 - 1$
 $1^2 - 1$
 (a) -12 (b) 4 (c) -4 (d) -2
- Given the matrix $K = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$, the matrix $K^2 + K + 1$ when 1 is 2×2 , identify matrix is
 (a) $\begin{pmatrix} 6 & 3 \\ 3 & 7 \end{pmatrix}$ (b) $\begin{pmatrix} 7 & 2 \\ 2 & 9 \end{pmatrix}$ (c) $\begin{pmatrix} 9 & 8 \\ 8 & 10 \end{pmatrix}$ (d) $\begin{pmatrix} 10 & 7 \\ 7 & 11 \end{pmatrix}$
- If $y/2 = x$, evaluate $x^3/y^2 + \dots + (-x^2/y^2)$
 (a) $-5/2$ (b) $5/8$ (c) $5/16$ (d) $5/2$
- Let $p = (1, 2, u, v, w, x)$,
 $Q = (2, 3, u, v, w, 5, 6, y)$ and
 $R = (2, 3, 4, v, x, y)$,
 Determine $(P/Q) \cdot R$
 (a) (b) (x) (c) (x, y) (d) $(1, x)$
- If $y = 2x \cos 2x - \sin 2x$, find dy/dx when $x = \pi/4$
 (a) 0 (b) 2 (c) $2(d)$
- A binary operation $*$ is defined by $a*b = ab$ if $a^2 = 2 - a$, find possible value of a .
 (a) $-1, 2$ (b) $-2, 7$ (c) $1, 2$ (d) $1, 2$
- If a and b are the roots of the equation $3x^2 - 5x - 2 = 0$, find the value of $1/a + 1/b$
 (a) $5/2$ (b) $-5/2$ (c) 1 (d) $-1/2$

- The 3rd term of an AP is $4x - 2y$ and the 9th term is $10x - 8y$, find the common difference.
 (a) x, y (b) $19x - 17y$ (c) $2x$ (d) $8x - 4y$
- Convert 38 in base 10 to a number of base 2.
 (a) 1001 (b) 11011 (c) 100101 (d) 111001
- Find the curved surface area of a cone whose base radius is 6cm and whose height is 8cm
 (a) 18cm^2 (b) 60cm^2 (c) 24cm^2 (d) 56cm^2
- If $\log_{32}(x^2 + 2x + 3) = 1/5$, find the value of x
 (a) 2 or 3 (b) -1 twice (c) 1 or -2 (d) 1 twice
- Rationalize the denominator $6 + 2\sqrt{5} - 36$
 (a) $12 + 4\sqrt{5} + 7x$ (b) $6 + 3 \times 30$
 19
 (b) $-(15 + 3x\sqrt{5} + 156 + 730)$
 3
 (c) $-(24 + 8\sqrt{5} - 186 + 630)$
 39
 (d) $-(12 + 4\sqrt{5} + 96 + 330)$
 19
- A ladder resting on a vertical wall makes an angle whose tangent is 2.4 and the distance between the foot of the ladder and the wall is 50cm. what is the length of the ladder?
 (a) 1m (b) 1.1m (c) 1.3m (d) 1.2m
- Find the value of x and y in the equations $2x + 5y = 11$, $7x + 4y = 2$
 (a) $x=8, y=0$ (b) $x=2, y=-3$
 (c) $x=34/27, y=73/27$
 (d) $x = -27/34, y=73/27$
- If $y = 2x^2 + 9x - 35$, find the ranges of values of which $y < 0$
 (a) $-5 < x < 7$ (b) $-7 < x < 5/2$
 (c) $-7/2 < x < 5$ (d) $-5 < x < 7$

18. If the first term and the sixth term of the geometric progression is 9 and $32/27$, calculate the sum of the first four terms?

(a) $212/3$ (b) 23 (c) 23. (d) $362/3$

19. $\sin = 3/2$ are less than 900. $\tan(90 -) \cos^2$

(a) $x^3/2$ (b) . (c) $4/3$ (d) 23

SOLUTION

1. Hint: At the point(s) of intersection of the graph $y = 1(x) = 2(x)$. Therefore, at the 6 point of intersection of $y = px^2 + q$ and $y = 2x^2 - 1$

$$px^2 + q = 2x^2$$

$$q + 1 = 2x^2 - px^2$$

$$q + 1 = x^2(2 - p) \text{ by factorizing } x^2$$

Dividing both sides by $2 - p$

$$x^2 = \frac{q + 1}{2 - p}$$

$$2 - p$$

Substituting $x = 2$ (the given point of intersection)

$$2^2 = \frac{q + 1}{2 - p}$$

$$2 - p$$

$$4 = \frac{q + 1}{2 - p}$$

$$2 - p$$

Multiplying both sides by $2 - p$

$$8 - 4p = q + 1$$

$$\Rightarrow = 7 - q$$

$$4 \text{ (A)}$$

2. Total number of pupils in the Sunday school = 50

Total number of pupils above 15 years but less than 21 years = $15 + 10 = 25$

Percentage of the total number of pupils above 15 years but less than 21 year = $25/50 \times 100\% = 50\%$ (B)

3. -1 -1 -1

3 1 -1

1 2 1

$$= -1 \cdot 1 \cdot -1 - (-1) \cdot 3 \cdot -1 + (-1) \cdot 3 \cdot 1$$

$$2 \cdot 1 \cdot 1 \cdot 1 \cdot 2$$

$$= -1(1+2) + 1(3+1) - 1(6-1)$$

$$= -3 - 5 = -8 \text{ (C)}$$

4.

5. To evaluate $(x^2/y^2 + \dots) + (\dots - x^2/y^2)$

Given that $y/2 = x$

$$y/2 = x \Rightarrow x/y = \dots$$

Hence, $(x^2/y^2 + \dots) + (\dots - x^2/y^2)$

$$= ([x/y]^3 + \dots) + \dots - [x/y]^2$$

Putting $x/y = \dots$

$$= ([\dots]^3 + \dots) + (\dots - [\dots]^2)$$

$$= (1/8 + \dots) + (\dots - \dots)$$

$$= 5/8 + \dots$$

$$5/8 \times 4/1 = 5/2 \text{ (D)}$$

$$6. P/Q = (1, x)$$

$$\therefore (P/Q) R = (x) (B)$$

$$7. y = 2x \cos 2x - \sin 2x$$

$$dy/dx = d/dx (2x \cos 2x) - d/dx \sin 2x$$

$$= 2 \cos 2x - 4x \sin 2x - 2 \cos 2x$$

$$= -4x \sin 2x$$

$$\therefore \text{when } x = \dots, dy/dx = -4 \times \dots \times \sin 2 \dots$$

$$= -4 \times 0 (\sin 2 = 0)$$

$$= 0 \text{ (B)}$$

$$8. a^2 = 2 - a$$

$$\Rightarrow a^2 = 2 - a$$

$$\Rightarrow a^2 + a - 2 = 0$$

$$\Rightarrow a^2 + 2a - a - 2 = 0$$

$$\Rightarrow a(a+2) - 1(a+2) = 0$$

$$\Rightarrow (a+2)(a-1) = 0$$

$$\Rightarrow a+2=0 \text{ or } a-1=0$$

$$\Rightarrow a = -2 \text{ or } 1 \text{ (B)}$$

9. Given and as the roots of the equation

$$3x^2 - 5x - 2 = 0$$

$$\text{The } + = 5/3; = -2/3$$

$$\therefore 1/+ 1/= +/$$

$$= 5/3 + -2/3 = 5/3 \times -3/2$$

$$= 5/2 \text{ (B)}$$

10. nth term of an AP. With first term 'a'

and common different 'd' = $a + (n-1)d$

$$3\text{rd term} = 4x - 2y \text{ and } 9\text{th term} = 10x - 8y$$

$$\Rightarrow a + 2d = 4x = 2y \text{ LL (i)}$$

$$a + 8d = 10x - 8y \text{ LLLL(ii)}$$

subtract (i) from (ii)

$$6d = 6x - 6y$$

Dividing through by 6, we get

$$d = x - y \text{ (A)}$$

$$11. 2 \ 38$$

$$2 \ 19 \ r \ 0$$

$$2 \ 9 \ r \ 1$$

$$2 \ 4 \ r \ 1$$

$$2 \ 2 \ r \ 0$$

$$2 \ 0 \ r \ 1$$

$$\therefore 3810 = 1001102 \text{ (A)}$$

12. Curved surface area of a cone = πrl

2nd Diagram

$$L = h^2 + r^2$$

$$\therefore \text{C.S.A.} = \pi \times 6 \times \sqrt{8^2 + 6^2}$$

$$= 6 \times 10 = 60\text{cm}^2 \text{ (B)}$$

$$13. \log_{32} (x^2 - 2x + 3) = 1/5$$

$$\Rightarrow x^2 - 2x + 3 = 32^{1/5}$$

$$x^2 - 2x + 3 = 2$$

$$\Rightarrow x^2 - 2x + 1 = 0$$

$$\Rightarrow (x - 1)^2 = 0$$

$$\Rightarrow x = 1 \text{ twice}$$

$$14. 6 + 25$$

$$4 - 36$$

Rationalize

$$6 + 25 \times 4 + 36$$

$$4 - 36 \ 4 - 36$$

$$24 + 18 \ 6 + 85 + 630$$

$$= 16 + 126 - 126 - 9 \ (6)$$

$$= 24 + 18 \ 6 + 85 + 630$$

$$16 - 54$$

$$= 2(12 + 96 + 45 + 330$$

$$- 38$$

$$= -(12 + 96 + 45 + 330$$

$$9 \text{ (D)}$$

15. **Diagram 3**

The length of the ladder is $\sqrt{AB^2}$

Using trig. ratio

$$\tan \theta = \frac{\sqrt{AC}}{50}$$

$$\Rightarrow \sqrt{AC} = 50 \times \tan \theta$$

$$= 50 \times 2.4 = 12\text{cm}$$

Using Pythagoras theorem

$$\sqrt{AB^2} = \sqrt{AC^2} + \sqrt{BC^2}$$

$$= 12^2 + 50^2$$

$$= 16900 = 130\text{cm} = 1.3\text{m} \text{ (C)}$$

$$16. 2x + 5y = 11 \text{ LLL(i)}$$

$$7x + 4y = 2 \text{ LLL..(ii)}$$

Using elimination method

Multiply (i) by 7 and (ii) by 2

$$14x + 35y = 77 \text{ LLLL. (iii)}$$

$$14x + 8y = 4 \text{ LLLLL. (iv)}$$

Subtract (iv) from (iii)

$$27y = 73$$

$$y = 73/27$$

Substitute the value to y in (i)

$$2x + 5(73/27) = 1$$

$$2x = 11 - 365/27$$

$$2x = 297 - 365 = -16$$

$$27 \quad 27$$

$$\Rightarrow x = -34/27$$

$$\therefore x = -34/27, y = 73/27 \text{ (C)}$$

$$17. y = 2x^2 + 9x - 35$$

By factorizing the L.H.S.

$$\Rightarrow y = 2x^2 + 14x - 5x - 35$$

$$y = (2x - 5)(x + 7)$$

$$\text{hence, } y < 0 \Rightarrow (2x - 5)(x - 7) < 0.$$

There are 2 possibilities

(1) $2x - 5 < 0$ and $x + 7 < 0$ or

(2) $2x - 5 > 0$ and $x + 7 < 0$

\Rightarrow (i) $x < 5/2$ and $x > -7$

\Rightarrow (ii) $x > 5/2$ and $x < -7$

But $x > 5/2$ and $x < -7$ is not possible. Therefore, $x < 5/2$ and $x > -7$

i.e. $-7 < x < 5/2$ (B)

18. nth term of a G.P. = ar^{n-1}

$a = 9$ LLL. L. (i)

$ar^5 = -32/27$ LL (ii)

put (i) in (ii)

$9r^5 = 32/27$

$R^5 = 32 = 2^5$

$9 \times 27 \times 35$

$\therefore r = 525/35 = 2/3$

Sum of the first n terms of a G.P =

$a(1 - r^n)$

$1 - r$

\therefore sum of the first four terms

$= 9(1 - [2/3]^4)$

$1 - 2/3$

$= 9(1 - 16/81)$

$1/3$

$= 3 \times 9 \times 9 \times 65/61 = 21 \frac{2}{3}$ (A)

19. $\sin = 3/2 = 600$

$\therefore \tan(900 -) = \tan 300 = 1/3$

$\cos^2 = \cos^2 600 = (1/2)^2 = .$

Hence, $\tan(900 -)$

\cos^2

$= 1/3 + .$

$= 4/3$

Rationalize to get

$= 43$

3 (C)

UNIVERSITY OF ILLORIN

2007 POST UME TEST

MATHEMATICS

1. A regular hexagon is constructed inside a circle of radius 6cm, the area of the hexagon is

(a) 54cm² (b) 543cm² (c) 542cm² (d) 545cm²

2. A solid cylinder of radius 3cm has a total surface area of 36cm²

Find its height.

(a) 2cm (b) 3cm (c) 4cm (d) 5cm

3. Simplify $\log_{10} 103 + \log_{10} 10$

(a) 61 (b) 3 (c) 5 (d) 4

4. Find the inverse of P under the binary operation * if $p*q = p+q-pq$ where p and q are real number and zero is the identity

(a) p (b) p-1 (c) p/p+1 (d) p/p-1

5. Find the value of $\frac{1-\cos^2\theta}{\sin^2\theta}$

(a) 1 (b) 2 (c) -1 (d) -2

6. If $\frac{dy}{dx} = 2x - 3$ and $y = 3$ when $x = 0$, find y in term of x.

(a) $x^2 - 3x - 3$ (b) $2x^2 - 3x$

(c) $x^2 - 3x + 3$ (d) $x^2 = -3x$

7. The sum of infinity of the series $1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \dots$ is

(a) $\frac{10}{3}$ (b) $\frac{11}{3}$ (c) $\frac{3}{2}$ (d) $\frac{5}{2}$

8. Find the equation of the locus of a point P(x,y) which is equidistant from Q(0,0) and R(2,1)

(a) $2x + y = 5$ (b) $4x + 2y = 5$

(c) $4x - 2y = 5$ (d) $2x + 2y = 5$

9. Simplify the express $1 - \cos x + \cos x$

(a) $\cos x$ (b) $\sin x$ (c) $1 - \cos x$

(d) $1 - \cos x \sin x$

SOLUTION

1. Diagram 4

Area of the regular hexagon

ABCDEF = 6 x area of OAB

48

Since the triangles are similar

$$AOB = 3600/6 = 600$$

Area of OAB

$$= \frac{1}{2} \times 6 \times 6 \times \sin 60^\circ$$

$$= \frac{1}{2} \times 6 \times 6 \times \frac{\sqrt{3}}{2}$$

$$= 93\text{cm}^2$$

Area of the regular hexagon =

$$6 \times 93\text{cm}^2 = 543\text{cm}^2 \text{ (B)}$$

2. Total surface area of a cylinder =

$$2rh = 2r^2 + 2r(r + h)$$

$$\Rightarrow 36 = 2 \times 3(3+h)$$

Divide both sides by 6

$$6 = 3 + h$$

$$\Rightarrow h = 6 - 3 = 3\text{cm}$$

The height is 3cm (B)

3. $\log_{10}103 + \log_{10}10$

$$= 3\log_{10}10 + \log_{10}10 = 3(1) + 1$$

$$= 4 \text{ (D)}$$

4. Let the inverse of p be p-1.

Then $p \cdot p^{-1} = e$ where 'e' is the identity element

$$\text{Now } p \cdot p^{-1} = e$$

$$\Rightarrow p + p^{-1} - pp^{-1} = 0$$

(definition of \cdot and identity element being 0)

$$p + p^{-1} - (1 \cdot p) = 0$$

$$p^{-1} (1 \cdot p) = -p$$

$$p^{-1} = p/p^{-1} \text{ by dividing both sides}$$

by 1-p (D)

$$\text{hence the inverse of } p = p/p^{-1}$$

5. 0

$$1 \cos^2 - 1$$

$$\sin^2 d$$

from the identity $\sin^2 + \cos^2 = 1$

we have that

$$0$$

$$1 \cos^2 - 1$$

$$\sin^2 d$$

$$= 0$$

$$1 - \sin^2 - 1$$

$$\sin^2 d$$

$$= 0$$

$$1 - d = -1/n$$

$$0$$

$$= - \text{ (C)}$$

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

Integrate both sides with respect to x

$$y = \frac{2x^2}{2} - 3x + c$$

$$y = x^2 - 3x + c$$

$$\text{At } x = 0, y = 3 \text{ in } *$$

$$3 = 0 - 0 + c$$

$$\Rightarrow c = 3$$

$$\text{Hence, } y = x^2 - 3x + 3 \text{ (C)}$$

$$7. 1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \dots$$

$$S = 1$$

$$1 - r$$

From the series, $a = 1, r = \dots$

$$\Rightarrow S = \frac{1}{1 - r}$$

$$1 - \frac{1}{3}$$

$$= S = 1$$

$$2.3 = \frac{3}{2} \text{ (C)}$$

8. Equation of the locus of a point p(x,y) which is

equidistant from Q (0,0) and R(2,1) is the

perpendicular bisector of the line joining Q and R.

$$\text{Midpoint of QR} = \frac{2+0}{2}, \frac{1+0}{2}$$

$$= (1, \frac{1}{2})$$

$$\text{Slope of QR} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 0}{2 - 0}$$

$$= \frac{1}{2}$$

Therefore, slope of the perpendicular bisector of QR =

$$-2 \text{ and a point on it is } (1, \frac{1}{2})$$

Using the formula $y - y_1 = m(x - x_1)$

The equation of the perpendicular bisector is $y - \frac{1}{2} = -2(x - 1)$

$$y - \frac{1}{2} = -2x + 2$$

$$\Rightarrow y = -2x + \frac{5}{2}$$

Multiply through by 2

$$2y - 1 = -4x - 4$$

$$4x + 2y = 5 \text{ (B)}$$

9. $1 - \cos x$

$$1 + \cos x$$

$$= (1 - \cos x)(1 + \cos x)$$

$$= (1 - \cos^2 x)$$

$$= \sin^2 x$$

$$1 + \cos x$$

$$= (1 - \cos x)^2$$

$$\sin^2 x$$

$$= 1 - \cos x \sin x \text{ (D)}$$

UNIVERSITY OF ILLORIN
2008 POST UME TEST
MATHEMATICS

1. If $x + 1$ is a factor of $2x^3 + 3x^2 + kx + 4$, find the value of k .
(a) -5 (b) 5 (c) -4 (d) 4 (e) 3
2. Obtain the maximum value of the function $(x) = x^3 - 12x + 4$
(a) 2 (b) 5 (c) -2 (d) 2 (e) 27
- Use the table below to answer question 13
- | | | | | | | | |
|----------------|---|---|---|---|---|---|---|
| No of children | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| No of families | 7 | 1 | 6 | 7 | 7 | 5 | 3 |
3. Find the mean of the distribution (a) 2 (b) 3 (c) 2.5 (d) 3.5 (e) 4
4. Let $A = \{1, 3, 7, 8\}$ and $B = \{2, 4, 7, 9\}$. The element which shows that the set A and B are not disjoint is LL
(a) 3 (b) 7 (c) 4 (d) 2 and 1 (e) 8
5. Let $(n) = n!$
(r) $r!(n-r)$
Evaluate $(7) + (5) + (3) + (2)$
(a) 35 (b) 75 (c) 45 (d) 55 (e) 30
6. Find the equation of the straight line through (1,2) and (3,8)

- (a) $y = x - 3$ (b) $2y = 3x + 1$
(c) $y = 3x - 1$ (d) $2y = 3x - 1$
7. Let $(x) = 3x + 1$. Find $\int (x) dx$ X + 2
(a) $5x - 3 \ln/x + 2/K$
(b) $3x - 5 \ln/x + 2/K$
(c) $5x/3 \ln/x + 2/K$
(d) $3x/5 \ln/x + 2/K$
(e) E.K
8. If $\log_2(3y^2 + 8y - 1) = 1$, evaluate Y.
(a) $y = 1/3$ or -3 (b) $y = -1/3$ or 3
(c) $y = -1/3$ or -3 (d) $y = 1/3$ or 3
(e) $y = 3$ (twice)

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SOLUTION

1. Let $p(x) = 2x^3 + 3x^2 + kx + 4$. Since $x + 1$ is a factor, by factor theorem, $p(-1) = 0$
 $\therefore p(-1) = 2(-1)^3 + 3(-1)^2 + k(-1) + 4 = 0$
 $\Rightarrow -2 + 3 - k + 4 = 0$
 $\Rightarrow 5 - k = 0$
 $\Rightarrow k = 5$

2. $f(x) = x^3 - 12x + 4$. At turning point, $f'(x) = 0$

$$\Rightarrow 3x^2 - 12 = 0$$

$$x^2 = 4$$

$$\Rightarrow x = 4 = 2$$

At $x = 2$, $f(2) = 2^3 - 12(2) + 4$

$$= 8 - 24 + 4 = -12$$

At $x = -2$, $f(-2) = (-2)^3 - 12(-2) + 4$

$$= -8 + 24 + 4 = 20$$

Hence, the maximum value of the function is 20

3. Mean = \bar{x}

$$= \frac{11 + 12 + 21 + 28 + 25 + 18}{6}$$

$$= \frac{115}{6}$$

$$= 19.17 \text{ (C)}$$

4. Reason: $AB = (7) \text{ (B)}$

5. $(7) + (5)$

$$(3) (2)$$

$$= \frac{71}{3} : \frac{4}{5} + \frac{51}{2} : \frac{3}{4}$$

$$= 7 \times \frac{5}{3} + 5 \times \frac{4}{2}$$

$$= \frac{35}{3} + 10$$

$$= \frac{35 + 30}{3} = \frac{65}{3} \text{ (C)}$$

6. Using $y = y_1 = y_2 - y_1$

$$x = x_1 x_2 - x_1$$

$$\Rightarrow y - 2 = 8 - 2$$

$$x - 1 = 3 - 1$$

$$y - 2 = 6$$

$$x - 1 = 2$$

$$\Rightarrow y - 2 = 3(x - 1)$$

$$y - 2 = 3x - 3$$

$$\Rightarrow y = 3x - 1 \text{ (C)}$$

7. $\int (3x + 1) dx$

$$= \frac{3x^2}{2} + x + 2$$

$$= (3x^2 + 2x + 4) dx$$

$$= 3x^2 - 5 \ln(x + 2) + k \text{ (B)}$$

8. $\log_2(3y^2 + 8y - 1) = 1$

$$\Rightarrow 3y^2 + 8y - 1 = 2^1$$

$$\Rightarrow 3y^2 + 8y - 3 = 0$$

$$3y^2 + 9y - y - 3 = 0$$

$$3y(y + 3) - 1(y + 3) = 0$$

$$(3y - 1)(y + 3) = 0$$

$$3y - 1 = 0 \text{ or } y + 3 = 0$$

$$\Rightarrow y = \frac{1}{3} \text{ or } -3 \text{ (A)}$$

UNIVERSITY OF ILLORIN

2009 POST UME TEST

MATHEMATICS

- Express p in terms of q if $\log_4 p + 2 \log_4 q = 4(16/q)^2$
(a) $(16/q)^2$ (b) $(4/q)^2$ (c) $(q/16)^2$ (d) $(q/4)^2$
- Find the possible values of p if the expression $4x^2 - 3px + 3p$ leaves a remainder 10 when divided by $x - p$
(a) 2 (b) 3 (c) 4 (d) 5
- If p and q are the roots of the equation $2x^2 - 5x - 7 = 0$, find the value of $1/a + a/1$
(a) $3/11$ (b) $-3/14$ (c) $2/14$ (d) $-2/14$
- Find the locus of a point that is equidistance from the points (1,2) and (3,8)
(a) $y = 1$ (b) $y = 1$
 $3(17-x) \quad 3(x+13)$
(c) $y = 1$ (d) $y = 1$
 $3(x+8) \quad 3(11-x)$
- A bag contains 5 black balls and 3 red balls. Two balls are picked at random without replacement. What is the probability that a black ball and a red ball are picked?
(a) $15/28$ (b) $13/28$ (c) $5/14$ (d) $11/12$
- A rectangular hexagon is constructed inside a circle of diameter 12cm. calculate the area of the hexagon.
(a) 36cm^2 (b) 363cm^2 (c) 543cm^2 (d) 54cm^2
- If the three consecutive terms of a GP are $n - 2$, n and $n + 3$, find the common ratio.
(a) . (b) . (c) . (d) 1 .
- In a triangle ABC, if the $AB = 15\text{cm}$ and angle $ABC = 45^\circ$ while angle $ACB = 60^\circ$, find the length of line AC
(a) 156cm (b) 106cm (c) 206cm (d) 56cm
- Find the derivative of the function $y = x^2(4x + 3)$ at the point $x = 2$
(a) 60 (b) 50 (c) 40 (d) 30

SOLUTION

- $\log_4 p + 2 \log_4 q = 4$
 $\log_4 p + \log_4 q^2 = 4$
 $\log_4 pq^2 = 4$
 $\Rightarrow pq^2 = 4^4$
 $= 44/q^2 = (42/q) = (16/q)^2$ (A)
- Let $(x) = 4x^2 - 3px + 3p$
Then, when (x) is divided by $x - p$, the remainder is (p)
 $\therefore (p) = 4p^2 - 3p \times p + 3p = 10$
 $4p^2 - 3p^2 + 3p = 10$
 $p^2 + 3p - 10 = 0$
 $p^2 + 5p - 2p - 10 = 0$
 $p(p+5) - 2(p+5) = 0$
 $(p+5)(p-2) = 0$
 $\Rightarrow p + 5 = 0$ or $p - 2 = 0$
 $\Rightarrow p = 15$ or 2 (A)
- $2x^2 - 5x + 7 = 0$
The general quadratic equation is of the form $ax^2 + bx + c = 0$
From this, we have
 $X^2 + b/a X + c/a = 0$
If α, β are roots of the quadratic, then $\alpha + \beta = -b/a$
 $\alpha\beta = c/a$
 \therefore For $2x^2 - 5x + 7 = 0$
 $a = 2; b = -5; c = +7$
 $\therefore \alpha + \beta = 5/2, \alpha\beta = 7/2$
Hence, $1/\alpha + 1/\beta = 2 + 2$
 $= (\alpha + \beta) / \alpha\beta = 2 - 2$
 $(5/2)^2 - 2(+7/2) = 25/4 - 7$
 $-7/2 - 7/2$
 $= 25 - 28 \times -2 = 3 \times -2$

4 7 4 7
 = 3/14 (A)
 4. Let the point be p(x,y)
 Distance between p(x,y) and (1,2)
 $= (x-1)^2 + (y-2)^2$
 Distance between p(x,y) and (3,8)
 $= (x-3)^2 + (y-8)^2$
 $\therefore (x-1)^2 + (y-2)^2 = (x-3)^2 + (y-8)^2$
 $\Rightarrow (x-1)^2 + (y-2)^2 = (x-3)^2 + (y-8)^2$
 $x^2 - 2x + 1 + y^2 - 4y + 4 = x^2 - 6x + 9 + y^2 - 16y + 64$
 $2x + 16y - 4y + 1 + 4 = 9 + 64$
 $4x + 12y = 73 - 5$
 $4x + 12y = 68$
 Divide through by 4
 $x + 3y = 17$
 $3y = 17 - x$
 $y = \frac{1}{3}(17-x)$ (A)
 5. Let pr (B) be the probability of picking a black ball
 and pr (R) be the probability of picking a red ball
 $\Pr(B \& R) = \Pr(B/R) \text{ or } \Pr(R/B)$
 $= (5/8 \times 3/7) + (3/8 \times 5/7)$
 $= 15/56 + 15/56$
 $= 30/56 = 15/28$ (A)
6. diagram 5
 Area of the hexagon = 6 x area of OAB. Using the
 diagram above
 $= 3600/6 = 600$
 Area of OAB = $\frac{1}{2} \times 6 \times 6 \sin 60^\circ = 18 \times \frac{\sqrt{3}}{2}$
 $= 9\sqrt{3}\text{cm}^2$
 \therefore Area of the hexagon = 6 x $9\sqrt{3}\text{cm}^2$

= 543cm² (C)
 7. Since n -2, n and n + 3 are consecutive, the
 common ratio r;
 $r = \frac{n}{n-2} = \frac{n+3}{n}$
 solving $\frac{n}{n-2} = \frac{n+3}{n}$
 $n^2 = (n+3)(n-2)$
 $n^2 = n^2 - 2n + 3n - 6$
 $n^2 = n^2 + n - 6$
 $0 = n - 6$
 $\Rightarrow n = 6$
 Hence, the common ratio is $6/4 = 3/2$ (D)
8. Diagram 6
 Using sine rule $b/\sin B = c/\sin C$
 $b/\sin 45^\circ = 15/\sin 60^\circ$
 $b = 15 \times \sin 45^\circ = (15 \times \frac{1}{\sqrt{2}}) + 3$
 $\sin 60^\circ = \frac{\sqrt{3}}{2}$
 $= 15 \times \frac{1}{\sqrt{2}} \times \frac{2}{\sqrt{3}}$
 $= \frac{30}{\sqrt{6}} = \frac{30\sqrt{6}}{6}$
 $= 5\sqrt{6} = 56$
 9. $y = x^2(4x + 3)$
 $= 4x^3 + 3x^2$
 $dy/dx = 12x^2 + 6x$
 Then, at $x = 2$
 $dy/dx = 12(2)^2 + 6(2)$
 $= 12(4) + 6(2)$
 $= 48 + 12$
 $= 60$ (A)

UNIVERSITY OF ILLORIN

2006 POST UME PAST

1. A mixture of solutions of barium chloride and sodium trioxocarbonate IV yield a white precipitate
 - a. Soluble in ammonia
 - b. soluble in dilute hydrochloric acid
 - c. soluble in alkali
 - d. soluble in dilute tetraoxosulphate VI acid
2. Four solutions P, Q, R, and S contain chloride, sulphide, tetraoxosulphate VI and trioxocarbonate IV respectively. One reagent that will identify only one of them completely by a precipitation reaction is
 - a. Potassium hydroxide solution
 - b. Dilute tetraoxosulphate (VI) acid
 - c. Dilute trioxonitrate (V) acid
 - d. Lead trioxonitrate (V) solution
3. Which of the following is true of alkalis
 - a. They have a sour taste
 - b. They liberate ammonia when added to ammonium chloride
 - c. Their pH is 7
 - d. They turn phenolphthalein colourless
4. Real gases do not obey the ideal gas laws at
 - a. High temperature
 - b. Low temperature and high pressures
 - c. Low pressures
 - d. High temperatures and pressures
5. A 3.0 g mixture of sodium trioxocarbonate (IV) and calcium trioxocarbonate (IV) liberated 0.44g of carbon IV oxide on strong heating until no more gas was evolved.
What is the percentage of sodium trioxocarbonate IV in the mixture? [Ca = 40, C = 12, O = 16, Na = 23]
 - a. 67
 - b. 23
 - c. 76
 - d. 32
6. Which of the following planets contains a large amount of solid methane?
 - a. Jupiter
 - b. Neptune
 - c. Pluto
 - d. Saturn

7. What change will occur during the electrolysis of brine using carbon electrodes?
 - a. Chlorine will be given off at the cathode
 - b. Oxygen gas will be given off at the anode
 - c. Sodium will be deposited at the cathode
 - d. The volumes of hydrogen and chlorine given off during the same time are equal
8. Nuclear reactions can be used in the following except
 - a. gauging the thickness of objects
 - b. making atomic bombs
 - c. curing cancer
 - d. purifying water
9. Which of the following is a good conductor of electric current?
 - a. Mixture of petrol and kerosene
 - b. Aqueous solution of sugar
 - c. Mixture of ethanol and water
 - d. Aqueous solution of table salt
10. The pH value of an aqueous solution of a compound remains at 5 even when contaminated with small quantities of acid or alkali. Which one of the following pairs of compounds would produce such a solution?
 - a. Ammonia and ammonium chloride
 - b. Ethanoic acid and sodium ethanoate.
 - c. Hydrochloric acid and sodium chloride
 - d. Potassium hydroxide and potassium bromide.
11. A mixture of gases contains 64g of methane, 64g of oxygen and 64g of sulphur dioxide. The pressure of the mixture is 210kPa. What is the partial pressure (in kPa) of the methane expected to be?
 - a. 30
 - b. 60
 - c. 70
 - d. 120
12. One of these properties is unique to carbon alone

- a. Polymerization
 - h. Condensation
 - c. Catenation
 - d. hydrogenation
13. Consider the equation $\text{CH}_3\text{COOH} + \text{CH}_3\text{OH} \rightarrow \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}$ 14g of ethanoic acid reacted with 25g of methanol to give 8.5g of ester What is the percentage yield of ester? (C = 12, H = 1, O = 16)
- a. 49.24% b. 46.7% c. 35.8% d. 40.67%
14. A student prepares a sample of H_2 gas by electrolyzing water at 25°C . She collected 152 ml at a total pressure of 758mmHg. Vapour pressure of H_2O at 25°C is 23.76mm Hg. Calculate the partial pressure of H_2 , gas.
- a. 756.24mmHg b. 758.24mmHg c. 734.24mmHg d. 760mmHg.
15. The slippery nature of graphite is attributed to
- a. Covalent bonding
 - b. Presence of sp^2 hybridized carbon
 - c. Layer covalent bonding
 - d. Network covalent bonding

ANSWER KEY

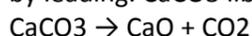
- 1. B 6.C 11.
- 2.D 7.D 12.
- 3.A 8.D 13
- 4. B 9.D 14
- 5.A 10.B 15

EXPLANATIONS TO THE QUESTIONS

- 1. $\text{BaCl}_2 + \text{Na}_2\text{CO}_3 \rightarrow 2\text{NaCl} + \text{BaCO}_3$ White precipitate of BaCO_3 . This is soluble in excess HCl (B).
- 2. Lead trioxonitrate (V) solution is used identifying sulphide. The paper turns black due to formation of black lead (II) sulphide (D)
- 3. Alkalis have sour taste. This is one of the properties of alkaline compounds (A)
- 4. Most real gases deviate from ideal gas law at low temperature and high pressure because these

conditions would cause the gas to condense and turn to the liquid state (B)

5. Na_2CO_3 and CaCO_3 , Na_2CO_3 cannot be decomposed by heating. CaCO_3 liberate CO_2 on heating.



No of mole of CO_2 0.44 = 0.01 44 mole

Mass of $\text{CaCO}_3 = 0.01 \times 100 = 1.0\text{g}$ % $\text{CaCO}_3 = \frac{1.0}{3.0} \times 100 = 33.3\%$

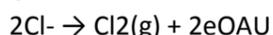
% $\text{Na}_2\text{CO}_3 = 100 - 33\% = 66.6 = 67\%$ (A)

6. Pluto is the smallest planet as well as the farthest from the sun. Pluto probably has a surface temperature of about 220°C on the Sun light region. Its body probably containing a large amount of solid methane (C)

7 $\text{NaCl} =$

At the cathode, H^+ being lower in the activity series, discharge in preference to Na^+

At the anode, even though both Cl^- and OH^- migrate to this electrode, Cl^- being present in greater concentration than OH^- is discharged in preference to OH^-



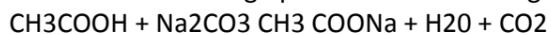
It should be noted that some discharge of OH^- occurs in electrolysis

This equation explains the reason for the volume of chlorine to be less than that of hydrogen. Ideally, the volume of the Cl_2 should be produced in equal volume here (D)

8. D

9. Table salt (NaCl) is ionic in nature, it will conduct electricity in its ionized form i.e. it is an electrolyte (D)

10. The compound/solution that exhibit this property is called buffer solution and it is formed by weak acid and base that undergo partial dissociation e.g.



UNIVERSITY OF ILLORIN 2008 POST UME CHEMISTRY

1. Water is temporarily hard because it contains
a) CaSO_4 b) MgSO_4 c) Chlorine d) $\text{Ca}(\text{HCO}_3)_2$
2. The oxidation number of nitrogen in Mg_3N_2 is a) +2
b) -3 c) +3 d) -6
3. The possible number of isomers in C_4H_{10} is a) 4 b) 3
c) 4 d) 10
4. If an element Z has an orbital configuration of $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$. What is the relative atomic number of Z? a) 18 b) 19 c) 20 d) 21
5. The percentage of oxygen in sulphur IV oxide is (S = 32, O = 16).
a) 5% b) 50% c) 500% d) 25%
6. 400cm^3 of a gas x diffused through a porous pot in 2 minutes. Calculate the rate at which x diffuses.
a) $6.3\text{cm}^3\text{s}^{-1}$ b) $20\text{cm}^3\text{s}^{-1}$ c) $200\text{cm}^3\text{s}^{-1}$ d) $3.33\text{cm}^3\text{s}^{-1}$
7. Calculate the number of moles of magnesium chloride produced by reacting 168g of magnesium trioxocarbonate(IV) with excess hydrochloric acid. (Mg = 24, C = 12, O = 16, H = 1, Cl = 35.5)
a) 4mole b) 3mole c) 2mole d) 1mole
8. The reducing agent in the reaction below
9. The following statements are correct except
a) Methane is tetragonal
b) Ammonium is tetragonal
c) Water is a linear molecule
d) Ammonia is trigonal

ANSWER KEY

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

EXPLANATION TO THE ANSWERS

I. Temporary hardness is caused by the presence of dissolved calcium hydrogen trioxocarbonate(IV) which decomposed by heating.

Since 1mole of MgCO_3 produces mole MgCl_2 at stp
2mole of MgCO_3 will produce 2mole MgCl_2 (C)

8. Fe^{3+} gain (accept) one electron to give Fe^{2+} while 1 loses (donate) one electron to produce Fe^{2+} . Reducing agents are electron donor (A).

9. Water is angular or V-shaped not linear (C)

UNIVERSITY OF ILLORIN 2010 POST UME TEST CHEMISTRY

1. A metallic element X forms an on X_2 what will be the formula of tetraoxosulphate of x

a) $\text{X}(\text{SO}_4)_3$ b) XSO_4 c) $\text{X}_2(\text{SO}_4)$ d) X_3SO_4

2. When air is passed through alkaline pyragallo. the component of air absorbed by the pyragallo is

a) Oxygen b) neon c) nitrogen d) argon

3. When water drops are added to calcium carbide in a container and the gas produced is passed through jet and lighted, the resultant flame is called an

a) Oxyethane flame b) Oxyethylene flame c) Hydroxide flame d) Oxyacetylene flame

4. If the relative formula mass of a hydroxide $\text{M}(\text{OH})_3$ is 78gmo^{-1} what is the relative atomic mass, M?

a) 61 b) 59 c) 30 d) 27

5. An ion with a single negative charge becomes an atom by

a) Losing an electron b) losing a neutron c) gaining a neutron d) gaining an electron

6. $\text{CH}_3\text{COOH} + \text{CH}_3\text{OH} \rightarrow \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}$.

The reaction represented by the equation above is

- a) neutralization reaction b) esterification reaction c) de esterification reaction d) hydrolysis reaction
7. The metal extracted from Bauxite is
a) Calcium b) Magnesium c) Aluminium d) Copper
8. An atom of an element represented by X with A = 17 and Z = 8. How many neutrons does X contain?
a) 3 neutrons b) 5 neutrons c) 4 neutrons d) 9 neutrons
9. What type of oxide is aluminium oxide?
a) Basic oxide b) acidic oxide c) neutral oxide d) amphoteric oxide
10. Excess ethanol reacts with acidified KMnO_4 to form
a) Ethene b) Ethanoic acid c) Ethylethanoate d) Ethane
11. What is the value of X in the reaction below?
a) 234 b) 238 c) 230 d) 239
12. Two gas cylinders contain ethylene and acetylene respectively. One test, which can be used to distinguish between them is by
a) Passing each gas through dilute potassium permanganate solution b) Pass each gas through ammoniacal copper(I) chloride solution c) Passing each through bromine water d) Treating each gas catalytically with excess hydrogen gas
13. Brass and bronze are both metallic alloys, which of the following constituents is common to both alloys?
a) Tin b) Zinc c) Copper d) Lead
14. An organic compound has the empirical formula CH_2O . What is its molecular formula if its vapour density is 90? (H = 1, C = 12.0 = 16)
a) $\text{C}_4\text{H}_8\text{O}_4$ b) $\text{C}_{12}\text{H}_{24}\text{O}_{12}$ c) $\text{C}_6\text{H}_{12}\text{O}_6$ d) $\text{C}_3\text{H}_6\text{O}_3$
15. A technique that can be used to show that chlorophyll pigment in a mixture of chemical compounds is a single compound and not a mixture of several compounds is
a) Hydrolysis b) crystallization c) chromatography d) sublimation
16. Which of the following statements is not true as we move from left to right along the periodic table?
a) Atomic mass of elements increases
b) Electro positive character of elements increases
c) Atomic number of elements increases
d) Number of electrons in the outermost orbit of elements increases
17. What mass of a divalent metal, M (atomic mass 40) would react with excess hydrochloric acid to liberate 224cm^3 of dry hydrogen gas measured at s.t.p.?
a) 8.0g b) 0.04g c) 0.4g d) 1.0g (GMV = 22.4dm^3)
18. Which of the following is an acid salt?
a) NaHSO_4 b) Na_2SO_4 c) CH_3COONa d) Na_2S
19. An element with atomic number twelve is likely to be
a) Electrovalent with a valency of the
b) Electrovalent with a valency of 2
c) Covalent with a valency of 2
d) Covalent with a valency of 4
20. The approximate volume of air containing 10cm^3 of oxygen is
a) 10cm^3 b) 20cm^3 c) 50cm^3 d) 100cm^3
21. Duralumin consists of aluminium, copper and
a) Zinc and gold b) lead and manganese c) nickel and silver d) manganese and magnesium
22. Sodium hydroxide solution can be conveniently stored in a container made of
a) lead b) zinc c) aluminium d) copper

23. The energy change accompanying the addition of an electron to a gaseous atom is called
- First ionization energy
 - Second ionization energy
 - Electron affinity
 - Electron activity.
24. 50cm³ of hydrogen is sparked with 20cm³ of oxygen at 1000C and atmosphere. The total volume of the residual gases is a) 50cm³ b) 10cm³ c) 40cm³ d) 30cm³
25. The molarity of 2% by weight of aqueous solution of H₂SO₄ (molecular weight of 98)
- 3.55
 - 2.55
 - 0.02
 - 0.55
26. Alkanoic acids have volatility compared with alkanols because
- They are more polar than alkanol
 - They have two oxygen atoms while alkatiols have one
 - They form two hydrogen bonds while alkanols form one
 - They form hydrogen bonds while alkanols do not.
27. How many faradays of electricity are required to deposit 0.20 mole of nickel if 0.10 faraday electricity deposited 2.9.8g of nickel during electrolysis its aqueous solution? (N= 58 if 96500 mol⁻¹)
- 0.20
 - 0.39
 - 0.40
 - 0.50
28. In the process of silver plating a metal M the metal M is the
- Anode and a direct current is used
 - Cathode and an alternating current is used
 - Anode and an alternatng current is used
 - Cathode and direct current is used.
29. When a gas is compressed at very low temperature
- Its density decreases
 - It liquefies
 - Its temperature decreases
 - Temperature increases
30. Oxidation of concentration hydrochloric acid with manganese (IV) oxide liberates a gas used in the
- Manufacture of toothpaste

- Treatment of goiter
- Vulcanization of rubber
- Sterilization water

Answer key

- B 7. C 13.C 19.B 25C
- A 8. D 14.D 20.C 26.C
- D 9. D 15.C 21.D 27.C
- A 10.B 16.B 22.D 28.D
- A 11. A.B 17.C 23.C. 29.B
- B 12.B 18.A 24.A 30.D

EXPLANATION TO ANSWERS

- The metal must be divalent, i.e. having 2- electrons in its outermost shell to donate to the sulphate, SO₄ 4 to give XSO₄ (B)
- Alkaline pyragallol is used to absorb oxygen (A)
- $\text{CaC}_2 + 2\text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_2 + \text{Ca(OH)}_2$
Ethyne (ethylene) produced when passed through oxygen give oxyacetylene flame, used for welding (D)
- $M(\text{OH})_3 = 78\text{gmo}^{-1}$
 $M+(16+1)3 = 78$
 $M+(17 \times 3) = 78$
 $M=78-51 = 27$ (D)
- E.g. $\text{X} \rightarrow \text{X} + \text{e}$ (loss of electron) (A)
- The reaction is acid catalysed and reversible produce methylethanoate (ester) in the process called esterification (B)
- Bauxite (Al₂O₃·2H₂O) is an ore of aluminium (C)
- A ZX when A = 17 mass number
X = 8 atomic number
Atomic No. = no. of proton + no. of neutron = 17-8 = 9 (D)
- Aluminium form oxide called amphoteric. They exhibit both acidic oxide and basic oxide characteristics (D).

10. This is oxidation reaction, ethanol (a primary alcohol) gives ethanoic acid.

C_2H_5OH

\xrightarrow{mno}

CH_3COOH (ethanoic acid) (B)

11. P₅

$\frac{BK}{P} =$

$\frac{*}{r}$

F_(s_234)(?)

12. Ethylene (C_2H_4) and acetylene (C_2H_2). All alkynes with a terminal triple bond undergo substitution reaction with $CuCl$ to give reddish brown colouration of Cu_2C_2 (B).

13. Brass & Bronze are alloys they both contain copper (C).

14. Vapour density = $\frac{1}{2}$ x relative molar mass
Relative molar mass $2 \times 90 = 180$

$(CH_2O)_n = 180$

$[(12 \times 1) + (2) + (16)]n = 180$

$30n = 180$

$n = 6$

$(CH_2O)_6 = C_6H_{12}O_6$ (D)

15. Chromatography is a separation technique used to separate component, mostly coloured, depending on their rate of migration (C)

16. Although electropositivity decreases across the period, while electronegativity increase (B)

17. $M + 2HCl \rightarrow MCl_2 + H_2$

1 mole: 2 mole 1mole : 1mole

No. of mole = 0,224.m⁴

22.4dm³ = 0.01mole of hydrogen gas

Since 1 mole of H_2 is liberated by 1mole of M 0.01mole of H_2 will liberate 1mole of M Mass of M = $40 \times 0.01 = 0.4g$ (C)

18. Acid salt are produced as a result of incomplete displacement of hydrogen, e. g. $NaHSO_4$, $NaHCO_3$ (A)

19. An element with atomic number 12 is metallic divalent and a reducing agent, ionize by losing 2

electrons to combine with non-metals to form electrovalent bond (B)

20. Oxygen is 21% of oxygen

% oxygen = Vol of oxygen x 100

Total Vol of air

21% = $10cm^3 \times 100$

Total volume of air

Total vol. of air = $10cm^3 \times 100\% = 21\%$

21. Duralumin is an alloy of aluminium. copper, magnesium and manganese (D).

22. Zinc and aluminium readily dissolve in sodium hydroxide to form sodium zincate(I) and sodium aluminate(III), respectively. Sodium hydroxide do not react with lead. Copper, being fairly far down the activity series, has no action with alkalis (D)

23. The first ionization energy is the energy required to remove one electron from each atom is a mole of gaseous atoms, producing one mole of gaseous ion with a positive charge while electron affinity is the ability of an atom in gaseous form to attract electron toward itself (C)

24. $2H_2 + O_2 \rightarrow 2H_2O$

Reaction mole 2moles 1mole 2 moles

Reacting atom $50cm^2$ $20cm^3$ -

Reaction ratio $40cm$ $20cm$ $40cm$

Residual gas $10cm^3$ - $40cm^3$

Residual gas = unreacted hydrogen + formed water
= $10 + 40 = 50cm$ (A)

25. 2g of H_2SO_4 is in $1000cm^3$ of water Mass conc.
= $2g/dm^3$ molar conc. = mass conc./ molar mass $2/98$
 $0.02g/dm^3$

26. Alkanoic acid is less volatile because it is more stable compact to alkanol, it form dimmers that is two molecule are bonded at 2-site by hydrogen bond

27 $Ni \rightarrow Ni^{2+} + 2e^-$

At step 1 mole 2F

No. of mole = $\frac{P}{K}$

EK = 0.513mole

0.0153mole of Nickel will be deposited by 0. IF

0.2mole of Nickel will be deposited by

$\frac{0.0153}{0.2} = \frac{x}{0.4}$

$x = 0.306$

$x = 0.389F$ 0.4F (C)

28. As the current is passed through the cell, the plating metal dissolve at the anode, and the ion produced migrate to the cathode, where they are discharge and deposited as a layer on the object by direct current (D).

29. When air is compressed, it becomes liquefied (B)

$30 \text{ MnO}_2 + 4\text{HCl}$

$\xrightarrow{\text{t1.5}}$

$3\text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$

Chlorine is used in the treatment of water or for sterilization. (D)

UNIVERSITY OF ILLORIN 2007 POST LIME TEST - CHEMISTRY

1. The relative strengths of weak acids can be seen by a comparison of their

- a) pH value
- b) dissociation constants
- c) hydrogen ion concentrations
- d) molarities

2. Which of the following gases has the same volume under the same condition as 16g of sulphur (IV) oxide? (H=4, C = 12, N= 14, O = 16, S = 32, Cl = 35)

- a) 8g of hydrogen
- b) 5.5g of carbon(VI) oxide
- c) 11.0g of carbon (IV) oxide
- d) 5g of nitrogen

OH

3. $\text{CH}_3\text{—CH—CH}_2\text{—CH}_2\text{—NH}_2$. The two functional groups in the above compound are

- a) Amino and carbonyl
- b) Carbonyl and hydroxyl
- c) Hydroxyl and carboxyl
- d) Hydroxyl and amine

4. F-1 would have a larger radius than fluorine atom, because of

a) Addition of an extra electron in F-1

b) The ion was obtained after fluorine lost valence electron

c) The effective nuclear charge of F-1 is greater than that of F-1

d) F is an ion while F is not.

5. 0.1 Faraday of electricity was passed through a solution copper(II) sulphate. The maximum weight of copper deposited on the cathode would be

- a) 63.0g
- b) 32.0g
- c) 6.1g
- d) 3.2g

6. What is the concentration of H⁺ ion in mole's per dm³ of the solution of pH 4.398?

- a) 4.0×10^{-2}
- b) 4.0×10^{-3}
- c) 4.0×10^{-4}
- d) 4.0×10^{-6}

7. When 50cm³ of a saturated solution of a sugar (molar mass 342.0g) at 40°C was evaporated to dryness 31.2g of dry solid was obtained. The solubility of sugar at 40°C is

- a) 10.0 moles cm³
- b) 7.0moles dm⁻³
- c) 3.5moles dm³
- d) 2.0moles dm⁻⁴

8. When H₂S is passed into a solution of iron (III) chloride, the colour changes from yellow to green. This is because

- a) H₂S is reduced to S
- b) H₂S ion. are oxidized by Fe²⁺
- c) Fe²⁺

+ ions are oxidized by Fe²⁺ ions

- d) Fe²⁺ ions are reduced to Fe²⁺ ions

9. The oxide that remains unchanged when heated in hydrogen is

- a) CuO
- b) Fe₂O₃
- c) PbO₂
- d) ZnO

ANSWER KEY

1 C 2 C 3D 4 A 5 D 6- 7D

8D 9A

EXPLANATION TO ANSWER

1. The characteristic properties of an acid in solution are due to the presence of hydrogen ion. Weak

acids are only partially ionized in water. Such acid solution have a low concentration of hydrogen. Dissociation, constant K, is used to determine the strength of the end (B)

2. 16g of SO₂ no. of mole = $\frac{16}{64}$ M

MF = 0.25

8g of H₂ no. of mole =

K = 4

5.5g of CO₂ no. of mole = $\frac{5.5}{44}$ E.E

FF = 0.125

11.0g of CO₂ no. of mole = $\frac{11}{44}$ =

FF = 0.25

5g of N₂ no. of mole = 0.14 (C)

3 CH₃ – CH(OH) – CH₂ – CH₂NH₂ (Hydroxyl & amine) (D)

4. The ionic radii of negative ions are greater than the corresponding atomic radii, this is because a negative ion is formed by adding electron to the outermost shell, thus making it bigger (A)

5. Cu²⁺ + 2e⁻ → Cu

1 mole 2F

2F would deposit 1mole of Cu

1F would deposit .5 mole of Cu

0.1F would deposit (.5 x 0.1) mole of Cu

= 0.05mole of copper

mass = 0.05 x 63.5

= 3.2g (D)

6. pH = -log [H⁺]

4.398 = -log [H⁺]

[H⁺] = antilog (-4.398) [do it yourself]

7. Sugar + solution = sugar solution

50cm³

At 40°C solubility = 34.2g in 50g water Solution contain 34.2g

342g

No. of mole = $\frac{34.2}{342}$ mol

= 0.1mole

Solubility in mol/dm³ = $\frac{0.1}{0.05}$

50/1000

= 0.1 x 20

= 2mol/dm³ (D)

8. H₂S + 2FeCl₃ → FeCl₂ + 2HCl + S

-2 +3 +2 0

Hydrogen sulphide reduces a brownish yellow solution of iron(III) chloride to a green solution of iron(II) chloride. The hydrogen sulphide itself is oxidized to sulphur and hydrogen chloride. Iron(III) to iron(II) is gain of electron, the process is reduction i.e. Fe³⁺ is reduced to Fe²⁺ (D)

9. Copper is below hydrogen in activity series. Therefore, copper can not displace hydrogen (A)

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UNIVERSITY OF ILLORIN 2009 POST UME TEST - CHEMISTRY

- The formula of the compound formed in a reaction between a trivalent metal, M and a tetravalent non-metal X is a) MX b) M₃X₄ c) M₄X₃ d) M₃X₂
- One mole of propane is mixed with five moles of oxygen. The mixture is ignited and the propane burns completely.
What is the volume of the products at s.t.p.?
a) 112.0dm³ b) 67.2dm³ c) 56.0dm³ d) 4.8dm³
[G. M. V. = 22.4 dm³mol⁻¹]
- How many unpaired electrons are there in the electronic configuration of an element with atomic number 8?
a) 2 b)3 c)4 d)5.
- The secondary valence is called
a) Oxidation state b) Lewis base c) coordination number d) chelates
- Which of these is not a hygroscopic salt?
a) Calcium oxide b) magnesium chloride
c) copper (II) oxide d) sodium trioxonitrate(V)
- The order of decreasing s-character of Sp,Sp³& Sp² is
a) Sp, Sp², Sp³ b) Sp³, Sp², Sp c) Sp²,Sp, Sp³ d) Sp, Sp³, Sp²
- Brass and Bronze are both metallic alloys. Which of the following constituents is common to both alloys?
a) Lead b) Copper c) Tin d) Zinc
- The major process of manufacturing caustic soda on industrial scale is
a) Reduction of brine
b) Fusion of sodium and hydroxide
c) Electrolysis of brine
d) Concentration of brine
- Which of these compounds is not used as a fertilizer?
a) Sodium hydroxide
b) carbamide c) ammonium trioxonitrate
d) potassium tetraoxosulphate VI
- How many molecules are there in 5.6dm³ of ammonia at s.t.p.? G.V.M. = 22.4dm³ at s.t.p. NA=6.02x10²³mol⁻¹ a) 1.50 x 10²⁰ b) 1.50 x 10²¹ c) 1.50 x 10²² d) 1.50 x 10²³

Answer key

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

EXPLANATION TO THE QUESTION

- Metal M³⁺ (Trivalent)
X-4 (Tetravalent)
M is having 3-electrons in its outermost shell. It will donate 3-electrons in 4 folds to form an octet with X in 3-folds, to form M₄X₃ (C)
- C₃H₈ + 5O₂ → 3CO₂ + 4H₂O 1 mole 5mole 3mole 4mole
Vol of CO₂ = No. of mole x 22.4 at stp
3 x 22.4 = 67.2dm³ (B)
- 3 Atomic No. = 8 = 1s²2s²2p⁴
The electronic configuration gives 2-unpaired electron (A)
- The secondary valency is called co-ordination number (C)
- MgCl₂ is not hygroscopic but deliquescent (B)
- Sp – 50% s – character & 50% p-character

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Sp²- 33% s – character & 66.6% p-character

Sp³ – 25% s – character & 75% p-character

Order of decreasing sp > sp²> sp³ (A)

7. Brass & Bronze are both metallic alloy having copper as their common constituents (B)

9. Sodium hydroxide is an alkali, it is not used in fertilizer manufacturing. Carbamide give the soil nitrogen. ammonium trioxonitrate(V) give the soil ammonium and K₂SO₄ give sulphur (A)

10. At stp 22.4dm³ of ammonia have 6.02 x 10²³ molecule

5.6dm³ of ammonia will have

$M = \frac{V}{V_0} \times 6.02 \times 10^{23}$

= 1.505 x 10²³ molecule (D)