

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA (FUTMINNA)

**POST-UTME SCREENING
Past Questions & Solutions
2012 – 2005**

FUTMINNA 2010/2011 POST - UTME SCREENING

Answer all questions: shade the answer sheet as appropriate with HB pencil only

Time Allowed: 1hr 30mins

- Shadows and eclipses result from the
(A). refraction of light (B).rectilinear propagation of light
(C). diffraction of light (D).reflection of light
- An object which is 3cm high is placed vertically 10cm in front of a concave mirror. If this object produces an image 40cm from the mirror, the height of the image is
(A). 0.75cm (B).4.00cm (C).8.00cm
(D).12.00cm .
- A boy looks at the image of an object in a plane mirror. He observes two images, a main bright one and the other faint. The observe image result from
(A). reflection only (B). refraction only (C). diffraction and interference (D). reflection and refraction
- What must be the distance between an object and a converging lens of focal length 20cm to produce an erect image two times the object height? (A) 20cm (B) 15cm
(C) 10cm (D) 5cm
- For a short sighted person, light rays from a point on a very distant object is focused.
(A) in front of the retina
(B) on the retina by a converging lens
(C) behind the retina by a diverging lens
(D) in front of the retina at a distance of 2F from the lens
- When light is incident on an object which is magenta in colour, which of the following colours would be absorbed? (A). red and blue
(B).green only (C). red and green
(D). red only
- In a resonance tube experiment, the effective length of the air column for the first resonance is 20cm when set into vibration by a tuning fork of frequency 480Hz. Neglecting end effect, the velocity of sound air is
(A). 96ms' (B).255ms' (C).340ms' (D). 384ms'
- A some wire of length 100cm under a tension of 10N, has a frequency of 250Hz. Keeping the length

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of the wire constant, the tension is adjusted to produce a new frequency of 35011. The next tension is

(A) 5.1 N (B). 7. N (C). 14.ON (D). I
9.6N

9. One of the properties of the earth's magnetic field is that the

(A). north pole lies in the northern hemisphere
(B). geographic and magnetic meridians coincide
(C). earth's magnetic flux entirely horizontal
(D). earth's magnetic flux is entirely vertical at a place where the magnetic dip is zero

10. There cells each of e.m.f 1.5V and an internal resistance of 1.0 are connected in parallel across a load resistance 2.67 . Calculate the current in the load

(A)0.26A (B)0.4IA (C)0.50A
(D)0.79A

11. A government spokesman announced that efforts _____ release of the hostages are continuing

(A). to obtain (B). obtaining (C).for
obtaining (D). of obtaining

12. I know you think I'm talking nonsense, Shehu, but _____ you realize that I was right

(A). at one time (B). on time (C). in time
(D). at time

13. The Inspector of Education who made several trips on the bad road returned yesterday completely _____ by fever brought down (B).putdown

(C).worn down (D).worn off

14. The vice principal asked the students to always _____ this answers only from the textbooks recommended for the course. (A).

look out (B). search out (C). look up
(D). bring up

15 I know that your friend will not accept the proposal, _____

(A). and you neither (B) and neither you
(C).neither do you (D) neither will you

16. Mark is a very handsome fellow who informs me that he has I pretty girls

(A). a heart (B). a lip (C). an eye (D).a

check

17. Wale Agun, in creating his characters, draws freely _____ experience in life

(A) by (B) in (C) on (D) of

18. When I have an appointment with someone, I hate waiting

(A). to be keeping (B). for (C). being kept

(D). in being kept

19. It's no good about the result until you have sat for examination

(A). to worry (B). for worrying (C).

worrying (D) to have worried

20. If you don't want to your car to robbers, then don't travel in the night.

(A). loose (B). loss (C). lose

(D). lost

21. The number 25 when converted from the tens and units base to the binary base (base two) is one of the following. (A) 10011 (B)111011

(C).111000 (D)11001 (E).110011

22. Evaluate $(6.3 \times 10^7)/(8 \times 10^4)$ to 3 significant figures (A) 711 (B). 778.8 (C). 7.870 (D).8.770 (E).

88.70

23. The positive root of t in the following equation, $4t + 7t^2$: correct to 4 places of decimal, is

(A). 1.0622 (B)10.6225 (C)0.1328 (D).

0.3218 (E). 2.0132

24. The difference between the length and width of a rectangle 6cm and the area is 135cm². What is the length? (A) 25cm (B) 18cm (C)

15cm (D) 24cm (E) 27cm

25. The first term of an Arithmetic Progression is 3 and the fifth term is 9. Find the number of terms in the progression if the sum is 8. (A) 12

(B) 27 (C) 9 (D) 4 (E) 36

26. The difference between 4^7 greater than the sum of and

(A) 2328 (B).24/28 (C).5056

(D).27/28 (E). 48/56

27. Multiply $x^2 + x + 1$ by $x^2 - x + 1$.

A. $x^4 + 3x^2 + x + 1$ B. $x^2x^2 + x + 1$ C. $x^2 + 4x^2 - 6x + 1$

D. $x^4 - 6x^2 - 4x + 1$ E. $x^4 - x - x^3 - x^2 + 1$

28. A baking recipe calls for 2.5kg of sugar and 4.5kg flour. With this recipe some cakes were baked using 24.5kg of a mixture of sugar and flour. How much sugar was used?

(A) 12.25g (B) 6.5kg (C) 8.75kg (D)

15.75kg (E) 8.25kg

29. The sum of the root of a quadratic equation is $\frac{5}{2}$ and the product of its roots is 4. The quadratic equation is

(A). $2x^2 + 5x + 8 = 0$ (B). $2x^2 - 5x + 8 = 0$

(C). $2x^2 - 8x + 5 = 0$

(D). $2x^2 + 8x - 5 = 0$ (F). $2x^2 - 5x + 8 = 0 \Rightarrow 2x^2 - 5x - 8 = 0$

30. Solve the given equation $(\log_1 x)1 - 6\log_1 x + 9 = 0$ (A). 27 (B). 9 (C). L (D). 18

(F). 81

31. In which order are the following salts sensitive to light?

(A). $\text{AgI} > \text{AgCl} > \text{AgBr}$ (B). $\text{AgCl} > \text{AgI} > \text{AgBr}$

(C). $\text{AgBr} > \text{AgCl} > \text{AgI}$ (D). $\text{AgCl} > \text{AgBr} > \text{AgI}$

32. The pOH of a solution of 0.25 mol dm^{-3} of hydrochloric acid is

(A). 12.40 (B). 13.40 (C). 14.40 (D).

14.60

33. $\text{MnO}_4^- + 8\text{H}^+ + Y \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$ Y in the equation represents

(A). $2e^-$ (B). $3e^-$ (C). $5e^-$ (D). $7e^-$

34. Given that M is the mass of substance deposited in an electrolysis and Q the quantity of electricity consumed, then Faraday's law can be written as

(A). ZIQ (B). $\frac{Q}{Z}$ (C). $\frac{Z}{2Q}$ (D) $M =$

$\frac{QZ}{96500}$

35. 0.46g of ethanol when burned raised the temperature of 50g of water by 14.3K. Calculate the heat of combustion of ethanol. (O = 16, H = 1, Specific heat capacity of water = $4.2 \text{ Jg}^{-1} \text{K}^{-1}$)

(A). $+33000 \text{ KJ mol}^{-1}$ (B). $+300 \text{ KJ mol}^{-1}$

(C). $-3000 \text{ KJ mol}^{-1}$ (D). $-3000 \text{ KJ mol}^{-1} = 12,$

36. Powdered marble reacts faster with hydrochloric acid solution than the granular form because the powdered form has

(A). More molecules (B). more atom

(C). larger surface area (D). Relatively large mass

37. For a reaction in equilibrium, the species involved in the equilibrium constant expression are

(A). gaseous and solid species

(B). liquid and solid species

- (C). solid and dissolved species
(D). gaseous and dissolved species
38. A phenomenon where an element exists indifferent forms in the same physical state is known as (A).isomerism (B). amorphism (C). allotropy (D). isotropy
39. The substance often used for vulcanization of rubber is (A). chlorine (B). hydrogen peroxide (C). Sulphur (D). tetraoxosulphate(VI) acid
40. A gas that is not associated with global warming is (A)CO, (B)SO, (C)CH₄ (D)H₂
41. Which of the following structures is capable of producing more tissues in the stem of a herbaceous flowering plant? (A). epidermis (B).pericycle (C). xylem (D). cambium
42. The manufacture of carbohydrates by plants takes place only in (A). the leaves (B). the green stems (C). chlorophyllous parts (D). flower plants
43. A water culture experiment, a plant showed poor growth and yellowing of the leaves. These maybe due to deficiency of (A).copper (B). iron (C). magnesium (D). calcium
44. In million's test, when the reagent is added to a protein food item. a white precipitate is produced which turns (A). blue on heating (B). yellow on heating (C). green on heating (D). red on heat
45. Regulation of blood sugar level takes place in the (A). pancreases (B). ileum (C). liver (D). kidney
46. Unicellular organism transport essential nutrients directly to all parts of their bodies by the process of diffusion because they have (A). a large volume to surface area ratio (B). a large surface area to volume ratio (C).their bodies immersed in the nutrients (D).their outer membrane made of cellulose
47. The heart of the adult frog consists of (A). two auricles and two ventricles (B). one auricle and one ventricle

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- (C). two ventricles and one auricle
- (D). one ventricle and two auricles

48. In adult mammalian blood, the cell which lack nuclei are the

- (A). erythrocytes (B). lymphocytes
- (C).leucocytes (D). phagocytes

49. Which of the following movements occur during exhalations?

- (A). the diaphragm and intercostals muscles relax
- (B). the thoracic cavity increases in volume
- (C). the diaphragm and intercostals muscles contract
- (D). the diaphragm contracts and the intercostals muscles relax

50. In which of the following groups of animals is the Malphigian tubule found?

- (A). lizards, snakes and frogs
- (B).crickets, houseflies and grasshoppers
- (C). millipedes, centipedes and scorpions
- (D). earthworms, roundworms and flatworms

ANSWERS:

1B 2D 3D 4 5A 6B 7D 8C 9C 10D 11A 12C 13C 14C
15D16A 17C 18C 19C 20C 21W 22A 23 24C 25C 26B
27B
28C29B 30A 31A 32B 33D 34D 35C 36C 37D 38D 39C
40 41A42C 43C 44D 45A 46B 47D 48C 49A 50B

FUTMINNA 2009/2010 POST –UME SCREENING

Answer all questions: shade the answer sheet as appropriate with HB pencil only.

Time Allowed: 1 Hour

1. Which of the following is not an example of a force? (A) tension (B) weight (C) friction (D) mass (E) thrust.
2. A body moves along a circular path with uniform angular speed of 0.6 rads^{-1} and at a constant speed of 3.0 ms^{-1} . Calculate the acceleration of the body towards the centre of the circle
(A) 25.0 ms^{-1} (B) 5.4 ms^{-1} (C) 5.0 ms^{-1} (D) 1.8 ms^{-1} (E) 0.2 ms^{-1}

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3. Which of the following is a derived unit? (A) Ampere (B) Kilogramme (C) second (D) Ohm (E) Kelvin
4. A boy timed 20 oscillations of a certain pendulum three times and obtained 44.3s, 45.5s and 45.7s respectively. Calculate the mean period of oscillation of the pendulum
(A) 0.13s (B) 2.22s (C) 2.26s (D) 44.30s (E) 45.17s.
5. A particular starts from rest and moves with a constant accelerations of 0.5ms^{-2} . Calculate the time taken by the particle to cover a distance of 25m
(A) 2.5s (B) 7.1s (C) 10.0s (D) 50.0s (E) 100.0s
6. A block of material of volume $2 \times 10^{-5}\text{m}^3$ is suspended from a spring balance with half the volume of the block immersed in water. What is the reading of the spring balance? (Density of water = $1.0 \times 10^3\text{kgm}^{-3}$, $g=10\text{ms}^{-2}$) (A) 0.10N (B) 0.25N (C) 0.30N (D) 0.40N (E) 0.50N
7. An object is projected with a velocity of 100ms^{-1} from the ground level at an angle to the vertical. If the total time of flight of the projectile is 10s, calculate ($g=10\text{ms}^{-1}$)
(A) 00 (B) 300 (C) 450 (D) 600 (E) 900
8. How far will a body move in 4 seconds if uniformly accelerated from rest at the rate of 2ms^{-2}
(A) 32m (B) 24m (C) 16m (D) 12m (E) 8m
9. If the temperature of water is gradually increased from 00 to 40C , the density of the water within this range (A) increases for a while and then decreases (B) decreases for a while and then increases (C) increases gradually (D) decreases gradually (E) remains the same
10. The expansion of solid can be considered a disadvantage in the
(A) fire alarm system
(B) thermostat
(C) riveting of steel plates
(D) balance wheel of a watch
(E) flitting of wheels on rims
11. A solid metal cube of side 10cm is heated from 100C to 600C . if the linear expansivity of the metal

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is $1.2 \times 10^{-5} \text{K}^{-1}$, calculate the increase in its volume

(A) 0.6cm^3 (B) 1.2cm^3 (C) 1.8cm^3 (D) 3.6cm^3 (E) 6.0cm^3

12. A gas has a volume of 546cm^3 at 0°C . What is the volume of the gas at -100°C if its pressure

remains constant? (A) 346cm^3 (B) 446cm^3 (C) 546cm^3 (D) 646cm^3 (E) 746cm^3

13. An image which cannot be formed on a screen is said to be

(A) inverted (B) real (C) virtual (D) erect (E) blurred

14. Longitudinal waves cannot be

(A) diffracted (B) refracted (C) polarized (D) reflected (E) superposed

15. The images formed by a diverging lens are always

(A) diminished, virtual and inverted
(B) diminished, inverted and real
(C) diminished, virtual and erect
(D) magnified, virtual and erect
(E) magnified, real and inverted.

16. In the normal use of a simple microscope, a person sees an

(A) inverted, virtual and magnified image
(B) erect, virtual and magnified image
(C) erect, real and magnified image
(D) inverted, real and magnified image
(E) inverted and real image the same size as the object

17. A lens of focal length 15.0cm forms an upright image four times the size of an object, calculate the distance of the image from the lens (A) 11.0cm

(B) 18.8cm (C) 37.5cm (D) 45.0cm (E) 75.0cm

18. An object is placed between two mirrors which are inclined at an angle of 120° and facing each other. Determine the number of images observed in

two mirrors (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

19. In a ripple tank experiment, a vibrating plate is used to generate ripples in the water, if the distance

between two successive troughs in 3.5cm and the wave travels a distance of 31.5cm in 1.5s, calculate the frequency of the vibrator (A)

- 3.0Hz (B) 6.0Hz (C) 12.0Hz (D) 27.0Hz
(E) 73.5Hz

20. Which of the following have the longest wavelengths?

- (A) infra-red rays (B) gamma rays (C) xrays
(D) ultra-violet rays (E) radio waves

21. Simplify $125 - \frac{1}{3} \times 49 - \frac{1}{2} \times 100$ (A) 350

- (B) 35 (C) $\frac{1}{35}$ (D) $\frac{1}{350}$
(E) 0

22. If $32x = 27$, what is x ? (A) 1 (B) 1.5

- (C) 4.5 (D) 18 (E) 40.5

23. Express 0.00562 in standard form

- (A) 5.62×10^{-3} (B) 5.62×10^{-2}

- (C) 5.62×10^{-2} (D) 5.62×10^2

- (E) 5.62×10^3

24. Given that $\frac{1}{3} \log_{10} P = 1$, find the value of P,

- (A) $\frac{1}{10}$ (B) 3 (C) 10 (D) 100

- (E) 1000

25. Simplify: $\log_8(\log_2)$ (A) $\frac{1}{3}$

- (B) $\frac{1}{2}$ (C) $\frac{1}{3} \log_2$ (D) $\frac{1}{2}$

\log_2

26. If $\log x = 2.3675$ and $\log y = 0.9750$, find $x + y$, correct to three significant figures?

- (A) 1.18 (B) 1.3 (C) 9.03 (D) 9.44

- (E) 9.46

27. While doing his Physics practical, Idowu

recorded as 1.12cm instead of 1.21cm calculate his percentage error (A) 1.17% (B) 6.38% (C)

- 7.44% (D) 8.05% (E) 9.00%

28. Find the 4th term of an A.P whose first term is 2 and the common difference is 0.5

- (A) 0.5 (B) 2.5 (C) 3.5 (D) 4

- (E) 4.5

29. An arc of length 22cm subtends an angle of θ at the centre of the circle. What is the value of θ if the radius of the circle is 15cm? (Taken $\pi = \frac{22}{7}$) (A) 700

- (B) 840 (C) 960 (D) 1560

- (E) 1680

30. Find the sum of the first five terms of the GP

2, 6, 18,

- (A) 484 (B) 243 (C) 242 (D) 130

- (E) 121

31. Let J be the set of positive integers. If $H =$

$\{x : x \in J, x^2 < 3 \text{ and } x > 0\}$ then

- (A) $H\{1\}$ (B) H is an infinite set (C) $H\{0,1,2\}$ (D) $H=\{\}$ (E) $J<H$
32. In a class of 80 students, every student has to study Economics or Geography, or both Economics and Geography if 65 students studied Economics and 50 studied Geography, how many studied both subjects?
(A) 15 (B) 30 (C) 35 (D) 45
(E) 50
33. Factorize $x^2 + 4x - 192$
(A) $(x-4)(x+48)$ (B) $(x+48)(x+4)$ (C) $(x-12)(x-16)$ (D) $(x-12)(x-16)$ (E) $(x+12)(x+16)$
34. Factorize $2e^2 - 3e + 1$
(A) $(2e-1)(e-1)$ (B) $e+1)(2e+1)$ (C) $(2e+3)((3-2)$ (D) $(2e-3)(e-1)$ (E) $(e^2-3)(2e-1)$
35. Solve the equation $7y^2 = 3y$
(A) $y=3$ or 7 (B) $y=0$ or 7 (C) $y=0$ or $3/7$ (D) $y=0$ or 9 (E) $y=0$ or 10
36. Solve the equation $2a^2 - 3a - 27 = 0$ (A) $3/2, 9$ (B) $-2/3, 9$ (C) $3, -9/2$ (E) $-3, 9/2$
37. A sector of a circle of radius 7cm has an area of 44cm^2 , calculate the angle of the sector, correct to the nearest degree. (A) 60 (B) 260
(C) 520 (D) 1030 (E) 2060
38. If the shadow of a pole 7m high is $\frac{1}{2}$ its length, what is the angle of elevation of the sun, correct to the nearest degree? (A) 900 (B) 630
(C) 600 (D) 260 (E) 00
39. From the top of a building 10m high, the angle of depression of a stone lying on the horizontal ground is 69° . Calculate, correct to 1 decimal place the distance of the stone from the foot of the building
(A) 3.6m (B) 3.8m (C) 6.0m (D) 9.3m (E) 26.1m
40. The bearing of a point X from Y is 074° . What is the bearing of Y from X?
(A) 1060 (B) 1480 (C) 1640 (D) 2540 (E) 2860
41. The nucleus is considered the central of a cell because it
(A) contains the genetic material

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- (B) contains the nuclear sap
(C) is bounded by the nuclear membrane
(D) is located at the centre of the cell
42. The prokaryotic cell type is characterized by
(A) complex cytoplasm in which different regions are poorly defined
(B) localization of different regions of the cell into tissue
(C) collection of organelles and macromolecular complexes
(D) simple cytoplasm with well defined regions
43. The natural tendency of organisms as they evolve is to
(A) decrease in size (B) increase in number
(C) develop specialized structures (D) feed indiscriminately
44. In snails, the hard calcareous shells are secreted by the
(A) radula (B) tentidium (C) pneumostome (D) mantle
45. The ability of the cockroach to live in cracks and crevices is enhanced by the possession of
(A) wings and segmented body
(B) compound eyes
(C) claws on the legs
(D) dorso-ventrally flattened body
46. The caste of termite that lacks pigmentation is the (A) king (B) worker (C) soldier (D) queen
47. The structures that prevent food particles from escaping through the fish gills are called gill (A) arches (B) filaments (C) rakers (D) lamellae
48. A distinguishing feature of mammals is the possession of (A) skin (B) scale (C) nail (D) hair
49. Which of the following structures is capable of producing more tissues in the stem of a herbaceous flowering plant? (A) epidermis
(B) pericycle (C) xylem (D) cambium
50. The manufacture of carbohydrates by plants takes place only in
(A) the leaves (B) the green stems
(C) chlorophyllous parts (D) flowering

plants

51. In a water culture experiment, a plant showed poor growth and yellowing of the leaves. These may be due to deficiency of (A) copper (B) iron (C) magnesium (D) calcium
52. In millions test, when the reagent is added to a protein food item, a white precipitate is produced which turns (A) blue on heating (B) yellow on heating (C) green on heating (D) red on heating
53. Regulation of sugar level takes places in the (A) pancreas (B) Ileum (C) liver (D) kidney
54. Unicellular organisms transport essential nutrients direct to all parts of their bodies by the process of diffusion because they have (A) a large volume to surface area ratio (B) a large surface area to volume ratio (C) their bodies immersed in the nutrients (D) their outer membrane made of cellulose auricles
55. The heart of the adult frog consists of (A) two auricles and two ventricles (B) one auricle and one ventricle (C) two ventricles and one auricle (D) one ventricle and two auricles
56. In adult mammalian blood, the cells which lack nuclei are the (A) erythrocytes (B) lymphocytes (C) Leucocytes (D) phagocytes
57. Which of the following movements occurs during exhalation? (A) the diaphragm and intercostals muscles relax (B) the thoracic cavity increases in volume (C) the diaphragm and intercostals muscles contract (D) the diaphragm contrasts and the intercostals muscles relax.
58. In which of the following groups of animals is the malphigian tubule found? (A) lizards, snakes and frogs (B) crickets, house files and grasshoppers (C) millipedes, centipedes and scorpions (D) earthworms, roundworms and flatworms.
59. Which of the following is not a function of the mammalian skeleton? (A) protection (B) respiration (C) transportation (D) support
60. The most reliable estimate of growth is by

measuring changes in

- (A) length (B) volume (C) surface area
- (D) dry weight

61. Which of the following is a physical change?

- (A) the bubbling of chlorine
- (B) the bubbling of chlorine into a jar containing hydrogen
- (C) the dissolution of sodium chloride in water
- (D) the passing of steam over heated iron

62. In the reaction $\text{SnO}_2 + 2\text{C} \rightarrow \text{Sn} + 2\text{CO}$, the mass of coke containing 80% carbon required to reduce

- 0.302kg of pure tin oxide is (A) 40kg
(B) 0.20kg (C) 0.06kg (D) 0.0kg (Sn = 119, O=16 C=12)

63. The Avogadro number of 24g of magnesium is the same as that of

- (A) 1g of hydrogen molecules
- (B) 16g of oxygen molecules
- (C) 12g of carbon molecules
- (D) 35.5g of chlorine molecules.

64. If gas occupies a container of volume 146cm³ at 180C and 0.971atm, its volume in cm³ at STP is

- (A)133 (B) (C) 266 (D) 292

65. The volume occupied by 1.58g of a gas at STP is 500cm³. what is the relative molecular mass of the gas?

- (A) 28 (B) 32 (C) 44 (D) 71
- (GMV at STP = 22.40dm³)

66. Equal volume of CO₂, SO₂, NO₂ and H₂S were released into a room at the same point and time.

Which of the following gives the order of diffusion of the gases to the opposite corner of the room?

- (A) CO, SO₂, NO₂, H₂S
- (B) SO₂, NO₂, SO₂, H₂S, CO
- (C) CO, H₂S, SO₂, NO₂
- (D) CO, H₂S, NO₂, SO₂ (S=32, C=12; O=16, N=14, H=1)

67. A basic postulate of the kinetic theory of gases is that the molecules of a gas move in straight lines between collisions. This implies that

- (A) collisions are perfectly elastic
- (B) forces of repulsion exist
- (C) forces of repulsion and attraction are in

equilibrium

(D) collisions are inelastic.

68. Which of the following terms indicates the number of bonds that can be formed by an atom?

(A) oxidation number (B) valence

(C) atomic number (D)

electronegativity

69. $X(g) \rightarrow X(g)$: The type of energy involved in the above transformation is

(A) ionization energy (B) Sublimation energy

(C) lattice energy (D) electron affinity

70. Chlorine, consisting of two isotopes of mass number 35 and 37, has an atomic mass of 35.5. The relative abundance of the isotopes of the isotopes of mass number 37 is (A) 20 (B) 25 (C) 50

(D) 75

71. 10.0dm³ of air containing H₂S as an impurity was passed through a solution of Pb(NO₃)₂ until all the H₂S had reacted. The precipitate of PbS was found to weigh 5.02g. according to the equation,

$Pb(NO_3)_2 + H_2S \rightarrow PbS + 2HNO_3$ the percentage by volume of hydrogen sulphide

(A) 50.2 (B) 47.0 (C) 4.70 (D) 0.47

(Pb = 207, S = 32 GMV at STP =

22.4dm³)

72. A blue solid, T, which weighed 5.0g was placed on a table. After 8 hours, the resulting pink solid was found to weigh 5.5g it can be inferred that substrate T.

(A) is deliquescent (B) is hygroscopic (C) has some molecule of water of crystallization (D) is efflorescent.

73. The effluent of an industrial plant used plant used in the electrolysis of concentrated brine, with a flowing mercury cathode may contain impurities like

(A) oxygen (B) hydrogen (C)

mercury(II) chloride (D) hydrogen chloride

74. The solubility in moles per dm³ of 20g of CuSO₄ dissolved in 100g of water at 1800C is

(A) 0.13 (B) 0.25 (C) 1.25

(D) 2.00 (Cu = 63.5; S = 32, O =

16)

75. Smoke consists of

(A) solid particle dispersed in liquid

(B) solid particles dispersed in gas

(C) gas or liquid particles dispersed in liquid

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(D) liquid particles dispersed in liquid

76. $\text{Na}_2\text{C}_2\text{O}_4 + \text{CaCl}_2 \rightarrow \text{CaC}_2\text{O}_4 + 2\text{NaCl}$. Given a solution of 1.9g of sodium oxalate in 50g of water at room temperature, calculate the minimum volume of 0.1 M calcium chloride required to produce maximum calcium oxalate using the above equation

(A) $1.40 \times 10^2 \text{dm}^3$ (B) $1.40 \times 10^{-2} \text{dm}^3$ (C)

$1.40 \times 10^{-2} \text{dm}^3$ (D) $1.40 \times 10^{-2} \text{dm}^3$

77. 2.0g of a monobasic acid was made up to 250cm³ with distilled water 25.00cm³ of this solution required 20.00cm³ of 1.0M NaOH solution

for complete neutralization. The molar mass of the acid is

(A) 200g (B) 150g (C) 100g (D) 50g

78. What is the concentration of H⁺ ions in moles per dm³ of a solution of pH 4.398?

(A) 4.0×10^{-5} (B) 0.4×10^{-5} (C) 4.0×10^{-3} (D)

0.40×10^{-3}

79. What volume of 11.0M hydrochloric acid must be diluted to obtain 1dm³ of 0.05M acid?

(A) 4.5cm³ (B) 5.65cm³ (C) 6.76cm³ (D)

7.78cm³

80. If 10.8g of silver is deposited in a silver coulometer connected in series with a copper coulometer, the volume of oxygen liberated is

(A) 0.56cm³ (B) 5.60dm³ (C) 11.20dm³

(D) 22.40dm³ (Ag = 108; Cu = 64; GMV at STP = 22.40dm³)

Instruction: Choose the word opposite in meaning to the underlined word

81. The young engineer is good at terminating other people's products but has not been capable of _____ any of his own.

(A) integrating (B)

finishing (C) completing (D)

initiating (E) organizing

82. The manager who expected to be given respect was treated with _____

(A) dignity (B) scorn (C) shame (D)

cruelty (E) disloyalty

83. Those who had invitation cards were admitted to the party while those who had none were _____

(A) barred (B) repelled (C) expelled

(D) compelled (E) restricted

84. Nobody expects him to show _____ for his children but he certainly bestows too much affection on them. (A) love (B) concern (C) intimacy (D) devotion (E) hatred

85. The challenger was crude and inexperienced in contrast to the champion who was _____. (A) great (B) exposed (C) celebrated (D) refined (E) strong

From the words lettered A to E, choose the word that best complete each of the following sentences

86. The fishermen threw a stone into the river and this caused a _____. (A) sprinkle (B) sparkle (C) splash (D) spring (E) storm

87. The play was so interesting that the _____ clapped for quite a long time at the end. (A) spectators (B) watchers (C) congregation (D) people (E) audience

88. The building _____ because of weak structural foundation (A) tumbled (B) succumbed (C) somersaulted (D) collapsed (E) caved

89. The magazine was _____ by the government for an offensive publication. (A) prescribed (B) proscribed (C) suspended (D) condemned (E) persecuted

90. Many people reacted to the brutal murder of the popular journalist with strong _____. (A) indignation (B) demonstration (C) mobilization (D) condemnation (E) accusation

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

91. It takes a great deal of stamina to run the marathon race. (A) courage (B) determine (C) energy (D) intelligence (E) cleverness

92. But for the principal actor the play would have been dull.

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- (A) important (B) head (C) master (D) famous (E) main
93. An open car has no protection against the elements
(A) weather (B) emergency (C) molecule (D) atoms (E) atmosphere
94. He was reluctant to grant my request.
(A) disposed (B) delighted (C) reticent (D) unwilling (E) agreeable
95. The detective was perplexed when the clues in the murder case pointed to at least a dozen different suspects (A) surprised (B) confused (C) excited (D) discouraged (E) disappointed
96. The military governor called a concerted effort in solving the problems of the state.
(A) a dramatic (B) an agitated (C) a joint (D) a directed (E) an unfailing
97. My financial situation is so precarious that very soon I may be insolvent
(A) borrowing (B) stealing (C) soluble (D) dependent (E) bankrupt
98. The chairman is of the opinion that accepting the proposal would be inimical to the objectives of the association. (A) harmful (B) relevant (C) irrelevant (D) indispensable (E) helpful
99. The famous politician was noted for his pragmatic approach to issues of national interest.
(A) idealistic (B) romantic (C) compromising (D) practical (E) inconsistent
100. Kunle is very pessimistic about our chance of success
(A) sad (B) despondent (C) unconvinced (D) worried (E) concerned

SOLUTIONS TO POST UTME 2009/2010

1. A FORCE is an agent that changes or tends to change the state of rest or of uniform motion in a straight line of a body but MASS is the quantity of matter or stuff contained in a body = **D**
2. $V = wr = 0.6 \times 3 = 1.8\text{m/s} = \mathbf{D}$
3. = **B**
4. $44.3 + 45.5 + 45.7 = 45.17$ and $45.17 = 2.26s = \mathbf{C}$
3 20
5. $u = 0, a = 0.5\text{ms}^{-2}, s = 25, t = ?$ using $v^2 = u^2 + 2as$

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$$= 0 + 2(0.5)(25) = 25 \text{ if } v^2 = 25 \text{ then } v = 5 \text{ now using } v$$

$$= u + at \text{ we get } t = v - u = 5 - 0 = 10\text{s} = \mathbf{C} \text{ a } 0.5$$

$$6. \text{ From } T = 2U \sin \text{ we see that } Tg = 2U \sin$$

$$G = \sin^{-1}(Tg) = \sin^{-1}(10 \times 10) = \sin^{-1}(0.5) = 30^\circ = \mathbf{B}$$
$$(2U) (2 \times 100)$$

$$7. S = ut + \frac{1}{2} at^2 = 0 + \frac{1}{2} (2)(42) = 16\text{m} = \mathbf{C}$$

$$8. = \mathbf{C} \quad 10 = \mathbf{C}$$

$$11. = l_2 - l_1 = e$$

$$l_1(2 - 1) \quad l_1(2 - 1)$$

$$e = l_1(2 - 1) = 1.2 \times 10^{-5} \times 10 \times (60 - 10) =$$

$$6.0\text{cm}^3 = \mathbf{E}$$

$$12. \text{ From Charles's Law } V_1 = V_2, V_2 = V_1 T_2 =$$
$$546 \times 173$$

$$T_1 T_2 T_1 273 = 346\text{cm}^3 = \mathbf{A}$$

$$13. = \mathbf{C} \quad 14. \mathbf{C} \quad 15. \mathbf{C} \quad 16. \mathbf{B}$$

$$17. M = v = 4v = 4u \text{ where } v - \text{distance of image}$$

$$\text{from lens and } u - \text{distance of object from lens}$$

$$v = -v = 4u \text{ (any upright image is virtual and thus}$$
$$\text{negative)}$$

$$\text{From } \frac{1}{v} + \frac{1}{u} = \frac{1}{f} \text{ we put } \frac{1}{-v} + \frac{1}{u} = \frac{1}{-4u} \text{ thus } \frac{3}{v} = \frac{1}{u} \text{ so } v = 3u$$

$$15 \quad 4u \quad 15$$

$$4u = 45 \text{ and } u = 11.25. \text{ hence } v = 4u = 45.0\text{cm} = \mathbf{D}$$

$$18. = \mathbf{D} \quad 19. \text{ STV} \quad 20. \mathbf{C}$$

$$21. 125 - \frac{1}{3} \times 49 - \frac{1}{2} \times 100 = 1 \frac{1}{3} \times 1 \frac{1}{2} \times 100 = 1 \times$$
$$1 \times 1 = 1$$

$$125 \quad 49 \quad 5 \quad 7 \quad 35 = \mathbf{C}$$

$$22. 32x = 27 \text{ and } 27 = 33$$

$$2x = 3 \text{ and } x = \frac{3}{2} = 1.5 = \mathbf{B}$$

$$23. 5.62 \times 10^{-3} = \mathbf{A}$$

$$24. \frac{1}{3} \log_{10} P = 1 \text{ thus } \log_{10} P^{1/3} = 1 = \log_{10} 10$$

$$P^{1/3} = 10 \text{ so } P = 10^3 = 1000 = \mathbf{E}$$

$$25. \log_8 \frac{1}{2} = \frac{1}{2} \log_8 1 = \frac{1}{2} = \mathbf{B} \quad \log_8 81$$

$$26. \log x = 2.3675, \log y = 0.9750$$

$$X + y = \log x \times \log y = 2.3675 \times 0.9750 = 2.3083 = 2.31$$

$$(3\text{s.f.}) = \mathbf{B}$$

$$27. 1.21 - 1.12 = 0.09 \times 100\% = 9\% = \mathbf{E}$$

$$28. U_4 = ?, a = 2, d = 0.5 \text{ Using } U_n = a + (n - 1)d$$

$$U_4 = 2 + (4 - 1) 0.5 = 2 + (3) 0.5 = 3.5$$

$$29. \text{ STV}$$

$$30. S_n = a(r^n - 1) = 2(35 - 1) = 2(242)$$

$$r - 1 \quad 5 - 1 \quad 4 = 121 = \mathbf{E} \quad 31. = \mathbf{A}$$

$$32. = 80, E = 65, G = 50 \quad (E G) - (65 + 50) 80 =$$

$$38 = \mathbf{C}$$

33. $(x - 12)(x + 16)$
34. $2e^2 - 3e + 1 = e(2e - 3) + 1 = (2e - 3)(e + 1)$
35. $7y^2 = 3y$ so $7y^2 - 3y = 0$
36. $2a^2 - 3a - 27 = 0$ thus $x = 9/2$ or $x = -3 = \mathbf{E}$
37. $x^2 - 44 = x^2 - 22 \times 7 \times 7$ thus $= 1030 = \mathbf{D}$ 360
360 7
38. $\tan = 7/3.5$ thus $= 630 = \mathbf{B}$
39. $\tan 69 = x/10$ thus $x = 26.1 = \mathbf{E}$
40. $180 + 74 = 2540 = \mathbf{D}$
41. A 46. B 51. B 56. A
42. A 47. C 52. D 57. A
43. C 48. D 53. A 58. B
44. A 49. 54. B 59. C
45. D 50. C 55. D 60. D
61. C 62. STV
63. Avogadro's Number: at the same temperature and Pressure, equal volumes of all gases contain the same number of molecules. $N = 6.022 \times 10^{23}$ units of a specified item. $H_2 = 2.02$, $O_2 = 32.00$, $Cl_2 = 70.91 = \mathbf{C}$
64. Using $P_1V_1 = P_2V_2$ thus $V_2 = 0.971 \times 146 \times 273$
 $T_1 T_2 1 \times 291 = 133 = \mathbf{A}$
65. Using $PV = nRT$ but $n = m/M$ where $m =$ given mass and $M =$ Molar mass
 $PV = m RT$ and $M = mRT = 1.58 \times 8.314 \times 272$
 $M PV 101325 \times 5 \times 10^{-4} = 71 = \mathbf{D}$
66. $CO_2 = 12 + 2(16) = 44$ $NO_2 = 14 + 2(16) = 46$
 $SO_2 = 32 + 2(16) = 64$ $H_2S = 2(1) + 32 = 34$
The order should be: H_2S, CO_2, NO_2, SO_2
67. = A 68. B
69. X(g) $X^+(g)$ Z. Ionization energy
X(g) $X^-(g)$ Z. Electron affinity
70. $K \times 37 (100 - K) \times 35 = 35.5$
100 100
 $0.37K + 35 - 0.35K = 35.5$
 $0.02K = 0.5$ Thus $K \times 0.5 = 25 = \mathbf{B}$ 0.02
71. $Pb(NO_3)_2 + H_2S \rightarrow PbS + 2HNO_3$
1 mole of H_2S 1 mole of PbS
 $22.4dm^3 (207) + 32 = 239$
 $X \times 5.02$
 $X = 22.4dm^3 \times 5.02g = 0.47dm^3 \times 239g$
Percentage by volume is $0.47dm^3 \times 100 = 4.7 = \mathbf{C}$
10.0dm³ 1
72. = B 73. C

$$74. \text{CuSO}_4 = 63.5 + 32 + 32 + 4(16) = 159.5$$

$$\text{Moles} = \frac{20}{159.5} = 0.125$$

$$100 \times 0.125 = 12.5 \text{ and } 1000 \times 0.125 = 125$$

= C 100

75. = B 76. STV 77. STV

78. pH: The negative logarithm of the concentration (mol/L) of the H_3O^+ or (H^+) ion; the commonly used scale ranges from 0 – 14. $\text{pH} = -\log(\text{H}^+)$ and $-\log(\text{H}^+) = 4.398$

Multiplying through by -1 gives $\log(\text{H}^+) = -4.398$

Taking antilog of both sides gives $(\text{H}^+) = 10^{-4.398} = 4.0 \times 10^{-5}$ 79. STV

80. If 10.8g of sulphur is deposited in a silver coulometer connected in series with a copper coulometer, the volume of oxygen liberated is?

81. D 86. C 91. C 96. C

82. B 87. E 92. E 97. E

83. A 88. D 93. A 98. A

84. E 89. B 94. D 99. A

85. D 90. A 95. B 100. B

FUTMINNA 2008/2009 POST UME SCREENING

ANSWER ALL QUESTIONS: SHADE THE ANSWER SHEET AS APPROPRIATE WITH HB PENCIL ONLY

TIMB: 1 HR

From the list of words choose the one that best completes each sentence from 1 to 15

1. You are driving - fast for my liking (A) too (B) very (C) pretty (D) fairly
2. You have given me one orange - many (A) very (B) so (C) too (D) more
3. The upholstery work doesn't go - the colour of the car (A) after (B) by (C) with (D) for
4. I became depressed - hearing the news (A) at (B) with (C) as (D) on
5. He was punished for failing - his duty as a prefect of the school (A) on (B) about (C) with (D) in
6. Good discipline was instructed - the success achieved by the college (A) for (B) to (C) in (D) with

7. It was quite dark in the room - we couldn't see
(A) so (B) because (C) through
(D) yet
8. He needed work so late - he (A) does
(B) needs (C) did (D) need
9. If I had known he would come, I - have gone to meet him (A) may (B) will (C) should
(D) must
10. He - thirty when I first met him
(A) must have been (B) will have
(C) ought to be (D) must have to be
11. Where is that brother of- now? (A) you
(B) yours (C) our (D) your
12. Someone told me where it was, but I can't remember – (A) whom (B) it (C)
who (D) didn't
13. I guessed it was going to rain— ?
(A) did I (B) was it (C) wasn't it
(D) didn't I
14. Would you like the door — ? (A)
close (B) closes (C) closed (D) closing
15. You shouldn't put off- the assignment (A) to do
(B) to have done (C) having done (D) to have been

Choose the word(s) that is/are nearly composite in meaning to the underlined word and which correctly fill the blank in the sentence. From 16 to 20

16. The able-bodied should take care of the --- (A)
feeble (B) weak-minded (C) suffering (D)
soft-hearted
17. The chairman ordered him either to withdraw or to – his allegations
(A) affirm (B) draw (C) express (D)
complete
18. He shows plenty of good-will to his neighbours, but they bear nothing except - towards him
(A) bad luck (B) malice (C) anger (D)
unhappiness
19. I supported you said but I - the way you said it
(A) argued about (B) objected to (C)
interfered with (D) investigated
20. Though many of us were poor quite a few were
(A) arrogant (B) prodigal (C) affluent (D)
Luxurious
21. Homologous pairs of chromosomes separate during (A) cytolysis (B) cleavage (C) mitosis

(D) meiosis

22. An example of caryopsis is (A) guava (B) maize grain (C) coconut (D) tomato
23. The response of plants to external stimuli in a non-directional manner is known as (A) tactic movement (B) phototropism (C) geotropism (D) nastic movement
24. The most important hormone that includes the ripening of fruit is (A) ethylene (B) indole acetic acid (C) gibberellin (D) cytokinin
25. One example of fossil fuels is (A) limestone (B) coral (C) coal (D) firewood
26. The most effective method of dealing with nondegradable pollutants is by (A) dumping (B) recycling (C) incineration (D) burying
27. Mycorrhiza is an association between fungi and (A) protozoan (B) roots of highest plants (C) bacteria (D) filamentous algae
28. A limiting factor in a plant population near a chemical factory is likely to be (A) light (B) humidity (C) wind (D) pH
29. Soil fertility can best be conserved and renewed by the activities of (A) earthworms (B) man (C) rodents (D) microbes
30. The pioneer organisms in ecological succession are usually the (A) mosses (B) lichens (C) ferns (D) algae
31. The type of reproduction that leads to variant in animal and plant populations is (A) budding (B) sexual (C) vegetative (D) asexual
32. An insect with a mandibulate mouth part will obtain its food by (A) biting and chewing (B) chewing and sucking (C) chewing (D) sucking
33. Spines and shells on animals are adaptations of (A) camouflage (B) chemical defence

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- (C) physical defence (D) mimicry
34. The rods in the retina of the eye are examples of
(A) cells (B) tissues (C) organs (D) systems
35. A plant-like feature in Euglena is the (A) pellicle (B) pigment spot (C) large spot (D) gullet
36. The larval stage of mosquito is called (A) wriggler (B) grub (C) maggot (D) caterpillar
37. A peculiar characteristic of mammals is that they
(A) have teeth (B) are warm-blooded (C) have lungs (D) have sebaceous glands
38. The gall bladder of a mammal has a duct connected to the
(A) liver (B) duodenum (C) small intestine (D) pancreas
39. Rodent gnaw in food with their
(A) molar teeth (B) strong jaws (C) flatridged teeth (D) chisel-like front teeth
40. An example of a radically symmetrical organism
(A) planarian (B) hydra (C) tapeworm (D) roundworm
41. Find the slope of the curve $y = 2x^2 + 5x - 3$ at (1,4) (A) 4 (B) (C) 7 (D) 9
42. Determine the maximum value of $y = 3x - x^2$
(A) 0 (B) 2 (C) 4 (D) 6

43. By how much will the mean of 30, 56, 31, 55, 43 and 44 less than the median
(A) 0.75 (B) 0.50 (C) 0.33 (D) 0.17
44. The range of 4, 3, 11,9, 6, 15, 19, 23,27, 24, 21 and 61 is (A) 16 (B) 21 (C) 23 (D) 24
45. The mean of the numbers 3, 6, 4, x and 7 is 5, Find the standard deviation (A) $\sqrt{2}$ (B) $\sqrt{3}$ (C)
46. Find the remainder when $3x^3 + 5x^2 - 11x + 4$ is divided by $x + 3$. (A) 4 (B) 1 (C) -1 (D) -4
47. What are the integral values of x which satisfy the inequality $-1 < 3 - 2x < 5$?
(A) 2, 1,0,-1 (B)-1,0, 1,2 (C)-1,0,1 (D) 0,1,2.
48. Find the derivative of $(2 + 3x)(1 - x)$ with respect

to x. (A) $6x - 1$ (B) $1 - 6x$ (C) 6

(D) -3

49. Find the derivative of the function $y = 2x^2(2x - 1)$

at the point $x = -1$ (A) -6 (B) -4 (C) 16

(D) 18

50. Find the mean deviation of 1, 2, 3 and 4

(A) 1.0 (B) 1.5 (C) 2.0

(D) 2.5

51. Find the value of t if the standard deviation of

$2t, 3t, 4t, 5t$ and $6t$ is 2. (A) 1 (B) 2 (C) 3

(D) 4

52. In how many ways can 6 coloured chalks be arranged if are of the same colour?

(A) 60 (B) 120 (C) 240 (D) 360

53. A final examination requires that a student answers any 4 out of 6 questions. In how many ways can this be done? (A) 15

(B) 20 (C) 30 (D) 45

54. If the mean of five consecutive integers is 30, find the largest of the numbers

(A) 28 (B) 30 (C) 32 (D) 34

55. A bag contains 5 black, 4 white and x red marbles. If the probability of picking a red marble is $\frac{2}{5}$ find the value of x (A) 8

(B) 10 (C) 4 (D) 6.

56. For what values of n is $n+1 C_3 = 4(nC_3)$?

(A) 6 (B) 5 (C) 4 (D) 3

57. Find the roots of $x^3 - 2x^2 - 5x + 6 = 0$

(A) 1, 2, -3 (B) -1, 2, 3 (C) -1, 2, -3

(D) 1, -2, 3

58. Find the value of k if the expression $kx^3 + x^2 - 5x - 2$ leaves a remainder 2 when divided by $2x + 1$

(A) 10 (B) 8 (C) -10 (D) -8

59. If $y = x^2 - x - 12$ find the range of values of x for which $y > 0$.

(A) $x < -3$ or $x > 4$ (B) $x < -3$ or $x > 4$ (C) $-3 <$

$x < 4$ (D) $-3 < x < 4$

60. How many terms of the series 3, -6, +12, -24 + ... are needed to make a total of 1 -28?

(A) 12 (B) 10 (C) 9 (D) 8

61. The wavelength of the first overtone of a note in a closed pipe of length 33cm is

(A) 44cm (B) 33cm (C) 22cm (D)

17cm

62. None-luminous objects can be seen because they

(A) are polished (B) are near (C)

reflect light (D) emit light

63. The correct unit of energy density is

- (A) $\text{kg m}^{-3}\text{s}^{-2}$ (B) $\text{kg m}^{-1}\text{s}^{-2}$ (C) $\text{kg m}^3\text{s}^{-2}$ (D) $\text{kg m}^2\text{s}^{-2}$

64. The motion of smoke particles from a chimney is typical of

- (A) oscillatory motion (B) rotational motion
(C) circular motion (D) random motion

65. One of the properties of gamma rays is that they are

- (A) negatively charged (B) massive (C) neutral (D) positively charged

66. The process whereby the molecules of different substances moves randomly is called

- (A) surface tension (B) diffusion (C) capillarity (D) osmosis

67. The process whereby a liquid turns spontaneously into vapour is called

- (A) evaporation (B) regelation (C) boiling (D) sublimation

68. The velocity of sound in air will be doubled if its absolute temperature is

- (A) doubled (B) halved (C) constant (D) quadrupled

69. A thin converging lens has a power of 4.0 diopters, determine its focal length

- (A) 0.25m (B) 0.03m (C) 5.00m (D) 2.50m

70. An electric device is rated 2000W, 250V. The correct fuse rating of the device is

- (A) 8A (B) 9A (C) 7A (D) 6A

71. Satellite communication network makes use of

- (A) infra-reds (B) sound wave (C) visible light (D) radio wave

72. If two inductors of inductances 3H and 6H are arranged in series, the total inductance is

- (A) 18.0H (B) 9.0H (C) 2.0H (D) 0.5H

73. The current in a reverse-biased junction is due to

- (A) electrons (B) majority carriers
(C) holes (D) minority carriers

74. In an a.c circuit that contains only a capacitor,

the voltage lags behind the current by

(A) 90° (B) 180° (C) 600° (D) 300°

75. The ray which causes gas molecules to glow is known as

(A) molecular ray (B) gamma ray (C) anode ray (D) cathode ray

76. The charge carriers in gases are

(A) ions only (B) electrons and holes (C) electrons only (D) electrons and ions

77. Which of the following materials is a conductor?

(A) plastic (B) sodium (C) wax (D) glass

78. The instrument used for securing a large number of similar charges by induction is called

(A) capacitor (B) electrophorus (C) electroscope (D) proofplane.

79. The pitch of a sound note depends on

(A) timbre (B) harmonics (C) quality (D) frequency

80. In which of the following material media would sound travel fastest?

(A) water (B) oil (C) metal (D) gas

81. The shape of the s-orbital is (A) spherical

(B) elliptical (C) spiral (D) circular

82. A carcinogenic substance is (A) Asbestos dust (B) saw dust (C) nitrogen (II) oxide (D) carbon (II) oxide

83. In the electrolysis of brine the anode is (A)

platinum (B) copper (C) zinc (D) carbon

84. Which of the following halides has the highest entropy value (A) HF (B) HCl (C) HBr

(D) HI

85. The allotrope of carbon used in the decolourization of sugar is

(A) graphite (B) soot (C) charcoal (D) lampblack

86. Sulphur (IV) oxide bleaches by (A) reduction (B) oxidation (C) hydration (D) absorption

87. Aluminum hydroxide is used in the dyeing industry as a (A) salt (B) dye (C) mordant (D)

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dispersant

88. An isomer of C₅H₁₂ is (A) Butane (B) 2-methylbutane (C) 2-methylpropane (D) 2-ethylbutane

89. Vulcanization involves the removal of (A) A monomer (B) The single bond (C) The double bond (D) a polymer

90. Phenolphthalein in acid solution is (A) red (B) orange (C) colourless (D) yellow

91. When iron is exposed to moisture and it rusts, the value of G for the reaction is (A) neutral (B) zero (C) positive (D) negative

92. A substance that is used as a ripening agent for fruits is (A) Ethene (B) propene (C) Methane (D) Butane

93. The shape of the hydrocarbon compound CH₄ is (A) square planar (B) planar (C) linear (D) tetrahedral

94. Sugar is separated from its impurities by (A) precipitation (B) crystallization (C) distillation (D) evaporation

95. The component of an atom that contributes least to its mass is the (A) proton (B) nucleus (C) neutron (D) electron

96. An element will readily form an electrovalent compound if its electron configuration is (A) 2, 8, 1 (B) 2, 8, 4 (C) 2, 8, 8 (D) 2, 8, 5

97. The most suitable metal that can be used as a lightning conductor is (A) silver (B) copper (C) iron (D) aluminum

98. The most abundant element on the earth's crust is (A) Nitrogen (B) hydrogen (C) oxygen (D) fluorine

99. Metalloids are also referred to as (A) semi-metals (B) metals (C) colloids (D) non-metals

100. The ores that can be concentrated by floatation are (A) nitride ores (B) sulphide ores (C) oxide ores (D) chloride ores

SOLUTIONS TO POST UME 2008/2009

1. C 8. C 15. A

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2. B 9. A

3. C 10. A

4. D 11. B

5. D 12. C

6. A 13. D

7. B 14. C

16. Able-bodied: physical healthy, fit and strong in contract to somebody who is weak or disable ANS feeble = A

17. Withdraw: to move back or away from a place or situation; to make somebody or something do this ANS affirm = A

18. good-will: friendly or helpful feelings towards other people or countries ANS malice = B

19. Supported: to help or encourage somebody or something by saying/showing that you agree with them/it ANS objected to = B

20. Poor: you should know the proper definition of poverty if you are a Nigerian. Affluent: having a lot of money and a good standard of living = C

21. C 27. B 33. C 39. D

22. B 28. D 34. A 40. B

23. D 29. A 35. B

24. A 30. B 36. B

25. C 31. B 37. B

26. B 32. A 38. D

41. From the equation of a straight line: $y = mx + c$ where m is the slope

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y}{x}$ and $dy = 4x + 5x^2 - x^1x y dx$

when $x = 1$: $dy = 4(1) + 5 = 9 = \mathbf{D} dx$

42. $y = 3x^2 - x^3$ and $dy = 6x - 3x^2$ we that at Max. value $dy = 0 dx dx$

$6x - 3x^2 = 0$; $x(6 - 3x) = 0$ Hence either:

$x = 0$ or $6 - 3x = 0$; $x = 2$ or $0 = \mathbf{B}$

43. The Mean \bar{x} of the distribution = $\frac{x}{N} = \frac{30 + 56 + 31 + 55 + 43 + 44}{6} = 43.17$

The median, after rearranging the data; 30, 31, 43, 44, 55, 56

Median $(\frac{n+1}{2}) = \frac{6+1}{2} = 3 \frac{1}{2}$ th position = $\frac{43 + 44}{2} = 43.5$

Median - Mean = $43.5 - 43.17 = 0.33 = \mathbf{C}$

44. Range = $61 - 3 = 58$

45. $x = \frac{\sum x_i}{N} = \frac{3 + 6 + 4 + x + 7}{5} = 5$ thus $20 + x \cdot N = 20 + 5 \cdot 5 = 45$

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$$20 + x = 25 \text{ and } x = 25 - 20 = 5 \text{ NB } x = 5$$

$$(S.D)^2 = (x-x)^2 = 3^2 + (6-5)^2 + (4-5)^2 + (x-5)^2 + (7-5)^2 = 10$$

$$N \cdot 5 = 2$$

$$(S.D)^2 = 2 \text{ and } S.D = 2 = \mathbf{A}$$

46. From the remainder theorem; we take from $x + 3$ and factor out for when

$$x = -3. f(-3) = 3(-3)^3 + 5(-3)^2 - 11(-3) + 4 = 1. \text{ You can solve this by LONG division but it is LONG OK?}$$

Remainder

$$= 1 = \mathbf{B}$$

$$47. -1 < 3 - 2x < 5 \Rightarrow -1 < 3 - 2x \Rightarrow 3 - 2x < 5$$

$$-1 - 3 < 2x \Rightarrow -2x < 5 - 3$$

$$-4 < -2x \Rightarrow -2x < 2$$

$$x < 2 \Rightarrow x > -1$$

The integral values of x which satisfy the inequality can be obtained from the range above. They are $-1, 0, 1 = \mathbf{C}$

$$48. y = (2 + 3x)(1 - x) = 2 - 2x + 3x - 3x^2$$

$$y = 2 + x - 3x^2 \Rightarrow dy = 1 - 6x = \mathbf{B} \, dx$$

$$49. y = 2x^2 (2x - 1) = 4x^3 - 2x^2 \text{ and } dy = 12x^2 - 4x \, dx$$

and when $x = -1$

$$Dy = 12(-1)^2 - 4(-1) = 12 + 4 = 16 = \mathbf{C} \, dx$$

$$50. \text{ Mean } = \frac{x}{n} = \frac{1 + 2 + 3 + 4}{4} = \frac{10}{4} = 2.5 \text{ N } 4 \, 4$$

$$\text{Mean deviation} = \frac{\sum (x - \bar{x})}{n} = \frac{(1 - 2.5) + (2 - 2.5) + (3 - 2.5) + (4 - 2.5)}{4} = \frac{10}{4} = \mathbf{A}$$

$$51. x = 2t + 3t + 4t + 5t = 20t$$

$$5 = 4t$$

$$(S.D)^2 = (x - \bar{x})^2 = (2t - 4t)^2 + (3t - 4t)^2 + (4t - 4t)^2 + (5t - 4t)^2 = 10t^2 \text{ N } 5 \, 2$$

$$(2) = 10t^2 = 2; \text{ cross multiplying we get that } t^2 = 1 \text{ and } t = 1 = \mathbf{A}$$

52. Since 2 are of the same colour, we have:

$$2 \times 6P_2 = 2 \times 6! = 2 \times 6! = 60 = \mathbf{A} \, (6-1)! \, 4!$$

$$53. \text{ Selection entails combination thus; } 6C_4 = 15 \text{ ways} = \mathbf{A}$$

54. Let the first integer of the numbers be x :

$$X = x + (x + 1) + (x - 2) + (x - 3) + (x - 4) = 5x + 10$$

$$5 \cdot 5 = 30$$

$$5x + 10 = 150; 5x = 140 \text{ and } x = 28$$

$$\text{Hence largest of the numbers is } = x + 4 = 28 + 4 = 32 = \mathbf{C}$$

$$55. n(\text{Black}) = 5, n(\text{White}) = 4, n(\text{Red}) = x; \text{ hence}$$

$$\text{total} = x + 9 \text{ and } P(\text{red}) = x$$

$$x + 9. \text{ From the question we have that; } P(\text{red}) = \frac{2}{5} \text{ thus from above}$$

$$x = \frac{2}{5} \cdot 5x = 2(x + 9) = 2x + 18$$

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$$x+9. 5x - 2x = 18 \text{ and } x = 6 = \mathbf{D}$$

$$56. n+1C3 = 4(nC3) = (n+1)! = 4 n!$$

$$3!(n+1-3)!3!(n-3)!$$

$$(n+1)(n)(n-1)(n-2)! = 4 n(n-1)(n-2)(n-3)(n-4)!$$

$$3!(n-2)! 3!(n-3)(n-4)!$$

$$n(n+1)(n-1) = 4 [n(n-1)(n-2)]$$

$$n - 4n = -8 - 1 = -9. \text{ Hence } n = 3 = \mathbf{D}$$

$$57. f(1) = 13 - 2(1)^2 - 5(1) + 6 = 0, \text{ thus } (x-1) \text{ is a}$$

factor and by long division we get $x^2 - x - 6$.

$(x-1)(x^2 - x - 6)$ are factors thus we have

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

$$x = 1, -2, 3 = \mathbf{D}$$

$$58. kx^3 + x^2 - 5x - 2$$

$$2x + 1 = 0 \text{ thus } x = -\frac{1}{2}$$

$$f(-\frac{1}{2}) = k(-\frac{1}{2})^3 + (-\frac{1}{2})^2 - 5(-\frac{1}{2}) - 2 = 2 \Rightarrow -k + 1 + 5 - 2$$

$$- 2$$

$$8 - k = 2 \text{ simplifying further we have } -k = 16 - 2 - 20 +$$

$$16$$

$$-k = 32 - 22 = 10$$

$$k = -10 = \mathbf{C}$$

$$59. \text{ To find the range of } x \text{ for which } y > 0: \text{ i.e. } x^2 - x -$$

$$12 = 0$$

$$(x+3)(x-1) = 0 \text{ thus } x = 3 \text{ or } -4 \text{ we can plot the}$$

inequality graph for this to obtain $x < 3$ and $x > 4 = \mathbf{B}$

$$60. \text{ Sum of the series } = 1 - 28 = -255$$

$$r = -6/3 = -2, a = 3$$

$$\text{sum} = a(1 - r)^n = 3(1 - (-2))^n = -255$$

$$1 = r^{1+2}$$

$$-256 = 1 - (-2)^n : \text{ and } 256 = (-2)^n$$

$$(-28) = (-2)^n \text{ hence } n = 8 = \mathbf{D}$$

$$61. l = 3/4 \Rightarrow 3 = 4l = 4 \times 33 = 132$$

$$3l = 132 \text{ hence } l = 44\text{cm} = \mathbf{A}$$

$$62. \mathbf{C} \quad 65. \mathbf{C} \quad 68. \mathbf{A}$$

$$63. \mathbf{D} \quad 66. \mathbf{B}$$

$$64. \mathbf{D} \quad 67. \mathbf{A}$$

69. The power of the lens is equal to the reciprocal of the focal length and is measured in dioptres when f is in meters.

$$P = 1/f \Rightarrow f = 1/P = 0.25\text{m} = \mathbf{A}$$

$$70. P = IV \text{ and } I = P/V = 2000/250 = 8\text{A} = \mathbf{A}$$

$$71. \mathbf{D}$$

72. Since it all acts as resistance; resistance in series

$$R = R_1 + R_2$$

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Hence inductance = $3H + 6H = 9H = \mathbf{B}$

73. Reverse-biased junction (.i.e P-semiconductors) have more holes than electrons but the holes are the majority carriers of current= **C**

74. V_c lags I_c by $90^\circ = \mathbf{A}$

75. D 78. B

76. D 79. D

77. B 80. D

81. The s-orbital electrons move about to produce the effect of a spherical cloud round the nucleus.

Thus s-orbitals are spherically symmetrical

82. A 88. B 94. B 100. D

83. A 89. C 95. D

84. D 90. C 96. A

85. C 91. D 97. D

86. A 92. A 98. A

87. C 93. D 99. A

FUTMINNA 2007/2008 POST UME SCREENING EXERCISE

INSTRUCTION TO CANDIDATES

PLEASE ENSURE THAT YOU HAVE SUBMITTED ONLINE REGISTRATION FORM BEFORE AND AFTER THE EXAMINATION.

ANSWER ALL QUESTION TIME ALLOWED 1 ½ HOURS

Shade the answer sheet as appropriate with HB pencil Only

MATHEMATICS

1. Simplify $12^2 \times 6^2$. A. 2 6 B. 2

C. 6 D. 12×6 E. $6 \times 24 - 6$

2. Without using tables, the numerical value of $\log_7 49 + \log_7 (1/7)$ is A. 0 B. -1 C. 1 D. $\frac{1}{2}$

E. 36

3. If $x^2 - 6x + 1 = 0$, has coincident roots, the value of n is A. 9 B. -9 C. 3 D. 4

E. 36

4. The roots of $y^2 - y - 12 = 0$ are A. 4, -3

B. -4, 3 C. -4, -3 D. 4, 3

E. 36

5. $200 - 12$ is A. 2 2 B. 72

C. -2 2 D. 2 E. 4 2

6. If $8x/2 = 23/8 \times 43/4$ the value of x is A.1

B. $11/4$ C. $15/8$ D. $\frac{1}{4}$

E. $\frac{1}{2}$

7. In set theory, an empty set is represented with

A. B. $\{ \}$ C. $\{ . \}$ D. A and B E. All of

the above

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8. If $A = \{x \in \mathbb{N} : x^2 - 3x + 2 = 0\}$, $B = \{x \in \mathbb{N} : x(x - 3) = 0\}$,

$A \cup B$ is A. $\{3\}$ B. $\{1, 2\}$ C. $\{2\}$

E. $\{1, 2, 3\}$

9. What value of x satisfy the inequality $2x + 2 < 5$.

A. $x < 1$ B. $x < 1$ C. $x > 1$ D. $x > 1$

E. $0 < x < 1$

10. If the 39th term of an arithmetic progression is 141, what is the first term if the common difference is 2

A. 65 B. 141 C. 39 D. None

of the above E. All of the above

11. The sum to infinity of the series $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$

is

A. 1 B. 2 C. 3 D. $\frac{1}{2}$

E. $\frac{1}{3}$

12. The value of $\sin 3000$ is A. 3

B. $\frac{1}{2}$ C. $-\frac{1}{2}$ D. 3

E. 1

13. How many sides has a rectangular polygon whose interior angle is 144° ?

A. 12 B. 9 C. 8 D. 10

E. 11

14. Simplify $2\frac{2}{3} \times 3\frac{2}{5}$ A. 36

B. 9 C. 4 D. $\frac{1}{36}$ E.

None of the above

15. The equation $n^2 - 16n + 64$ has

A. equal roots B. imaginary roots

C. Distinct roots D. No roots E.

None of the above

16. The values of C for which $2c^2 - 11c + 12 = 0$ are

A. 4, $\frac{1}{2}$ B. -4, $\frac{3}{2}$ C. 4, $-\frac{3}{2}$ D. -4, -

$\frac{3}{2}$ E. 4, 3

17. Which of the following is not a surd A. 2

B. 3 C. 24 D. 9 E. None of the

above

18. Simplify $4^5 - 1$ B. $5 + 1$

C. $1 - 5$ D. 4 E. $\frac{4}{5} 5 - 1$

19. Solve $\frac{7}{8}$ of $2\frac{1}{4} + (\frac{25}{16} - \frac{17}{24})$ A. $\frac{12}{27}$

B. $\frac{15}{22}$ C. $\frac{63}{32}$ D. $\frac{48}{77}$

E. $\frac{17}{24}$

20. For what values of x and y are $x + y = 2$ and $2x - y = 7$?

A. $x = 3, y = -1$ B. $x = -3, y = 1$ C. $x = -$

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3, $y = -1$ D. $x = 1$, $y = 3$ E. $x = -1$, $y = 3$

Use the following data to answer: questions 21 – 25

6,0,1,2,6,8,2,1,5,1,4,9,6,1,5,6,5,6,8,6,6

21. The range of the values is A. 8 B. 9

C. 6 D. 7 E. 5

22. The sum of the numbers and the number of items are

A. 85, 20 B. 85, 19 C. 80, 20 D. 95,

21 E. 80,19

23. The mean value is A. 4.47 B. 4.0

C. 4.25 D. 4.05 E. 4.21

24. The medium mark is A. 6 B. 5

C. 7 D. 8 E. 4

25. The mode of the marks is A. 7 B. 6

C. 8 D. 5 E. 4

CHEMISTRY

1. Rhombic sulphur, monoclinic sulphur and amorphous sulphur are:

A. Isomers B. Isotopes C. Allotropes

D. Monomers E. Polymorphs

2. Laughing gas is

A. nitrogen (II) oxide B. Nitrogen (I) oxide C.

Nitrogen (III) oxide D. Nitrogen (V) oxide

E. Ammonia

3. The correct name of the compound

$\text{CH}_3\text{CH}_2\text{CONH}_2$ is

A. N-methyl-propionyl amide

B. Propionyl amide

C. Methyl propanamide

D. Methyl propionylamide

E. Propionylmethamide

4. The name pentanone is not specific and proper because it can refer to

A. 2-pentanone and 3-pentanone

B. 1- pentanone and 5-pentanone

C. Methyl propanone and propyl methanone

D. Methyl propanone and methyl propyl butanone

5. The oxide that remains unchanged when heated with hydrogen is

A. CuO B. Fe_2O_3 C. PbO_2 D. ZnO

E. Ag_2O

6. What is the most metallic element in the set

A. Na B. Ar C. P

D. A E. Mg

7. What is the mole fraction of water in a solution

prepared by mixing 12.5g of H_2O with 220g of acetone?

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A. 0.817 B. 0.845 C. 0.183 D. 0.155
E. 0.205

8. A consequence of global warming is:

A. Air pollution B. Wafer pollution C. Increased humidity D. Flooding E. Little sunshine

9. Gunpowder is made from charcoal, Sulphur and Potassium trioxonitrate(V). The salt in the mixture perform[^] function of: A. An oxidant

B. A reductant C. A solvent, D. A catalyst E. Exploder

10. Which one of the following group II elements has the highest first ionization energy?

A. Be B. Mg C. Ca D. Sr
E. B

11. In which one of the following compounds does sulphur have an oxidation number of +4?

A. H₂SO₄ B. H₂S C. SO₂ D. Na₂SO₃ E. H₂S₂O₇

12. Which one of the following does not show allotropy at room temperature and pressure?

A. Nitrogen B. Phosphorous C. Oxygen
D. Carbon E. Sulphur

13. Cellulose and starch can be classified as one of the following:

A. Sugar B. Sucrose C. hydrocarbon
D. Carbohydrates E. Fibres

14. What mass of anhydrous solution of sodium trioxocarbonate (IV) is required to prepare 250cm³ of 0.10M solution? (Na = 23, C = 12, O = 16)

15. How many isomers can be formed from organic compounds with molecular formula C₃H₈O?

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

16. Which of the following is not a property of magnesium oxide?

A. High melting point
B. Dissolution in polar solvent
C. Presence of ionic bonds
D. Possession of crystal lattice
E. low binding energy

17. Catalytic hydrogenation of alkenes produces compounds with general formula

A. C_nH_{2n+1}OH. B. C_nH_{2n+1} C. C_nH_{2n+2}

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D. C_nH_{2n-1} E. $C_n(H_2O)_y$

18. Tetraoxosulphate (VI) acid is described as strong acid because it is highly

A. Corrosive B. Concentrated C. Reactive D. Soluble in water E. Ionized in water

19. Which of these metals. Mg, Fe, Pb, and Cu will dissolve in dilute HCl if air is blown through the solution?

A. Mg and Fe only B. All the metals C. Mg, Fe and Cu D. Mg, Fe and Pb E. Mg, Pb and Cu. —

20. A correct electrochemical series can be obtained from K, Na, Ca, Al, Mg, Zn, Fe, Pb, H, Ag, Au by interchanging

A. Zn and Fe B. Zn and Pb C. Al and Mg D. Au and Ag E. None of the above. '

21. The oxidation of $CH_3CH_2(CH_3)OH$ gives:

A. 2-butanone E. Methyl butane B. 2-butanal C. Butane D. Butanoic

22. The solubility of alkanols in water is due to:

A. Their ionic character
B. Their covalent nature
C. Ability to form hydrogen bond
D. Their low boiling points
E. Their low dielectric com

23. The gas that is not associated with global warming is

A. CO_2 B. H_2 C. CH_4 D. SO

24. In which order are the following salts sensitive to light:

A. $AgBr > AgCl > AgI$
B. $AgCl > AgI > AgBr$
C. $AgI > AgCl > AgBr$
D. $AgCl > AgBr > AgI$
E. $AgBr > AgI > AgCl$

25. A phenomenon where an element exists in different forms in the same physical state known as:

A. Isomerism B. Amorphism C. Isotopy D. Allotropy E. Enantiomerism

PHYSICS

1. A piece of rubber 10cm long stretches 6mm when a load of 100N is hung from it. What is the strain?

A. 6×10^{-2} B. 60 C. 6
D. 0.6 E. 2×10^{-2}

2. Which of the following does not cause a

reduction of the surface tension of water?

- A. Soap solution B. Alcohol C. Camphor
D. Grease E. Solvent

3. The amount of heat required to raise the temperature of a body is

- A. Thermal capacity B. Thermal energy
C. Specific heat capacity D. Heat lost E. heat gain

4. Water shows anomalous behaviour

- A. below 100°C B. At exactly 4°C C. between 4°C and 100°C D. Between 0°C and 4°C E.

Above 100°C

5. Which of the following phenomena cannot be explained by the molecular theory of matter?

- A. Radiation B. Conduction C. Convection D. Evaporation E.

Saturation

6. A gas occupies a volume of 300cm³ at a temperature of 27°C. What is its volume at 540C, when the pressure is constant? A.

- 150cm³. B 273cm³ C.327cm³ D. 600cm³ E. 125cm³

7. A man clapping his hands at regular intervals observes that the echo of a clap coincides with the next clap. If the reflecting cliff is 160m away and the speed of the sound is 320mS⁻¹, what is the frequency of the clapping? A. 2HzK B.4Hz

- C. 8Hz D. 1Hz E. 12Hz

8. Which of the following properties is/are common to all waves? I Diffraction II Refraction III Frequency

- A. Ionly B. I and II only C.I, II and III only D. I and III only E. II only

9. Which of the following factors affects the speed of sound in air? I Temperature II Pressure III

Frequency

- A. II only B.I and II only C. I only D. II and III only E. III only :

10. When white light is dispersed by a spectrometer, the component having the shortest wavelength is

- A. Orange B. Green C. Red D. Violet E. Black

11. Shadows and eclipses result from the

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- A. Refraction of light
 - B. Diffraction of light
 - C. Rectilinear propagation of light
 - D. Reflection of light
 - E. Above tight
12. Which of the following media allow the transmission of sound waves through them: I Air II Liquid III Solid.
- A. I, II and III B. I and II only C. I and III only D. II and III only E. III only
13. The power dissipated in an a.c circuit with an r.m.s of 5A, r.m.s voltage of 10V and a phase angle of 60° is
- A. 50W B. 120W C. 125W D. 25W E. 12W
14. A light of energy 5eV falls on a metal and the electrons with a maximum kinetic energy of 2eV are ejected. The work function of the metal is
- A. 0.4eV B. 7.0eV C. 2.5eV D. 3.0eV E. 1.0eV
15. In semiconductors, the carriers of current at temperature are
- A. Electrons only B. Electrons and holes C. Holes only D. Electrons and ions E. Ions only
16. The temperature at which water vapour present in the air saturates the air and begins to condense is known as
- A. Boiling point B. Melting point C. Dew point D. Triple point E. Violet light
17. Which of the following pairs is not part of the electromagnetic spectrum?
- I Radio wave II Beta waves III Gamma rays IV Alpha rays
- A. I and II B. II and IV C. III and IV D. I and III E. all of the above
18. A wave of frequency 10Hz forms a stationary wave pattern in a medium where the velocity is 20cmS⁻¹. The distance between the adjacent modes is
- A. 15cm B. 1.0cm C. 2.0cm D. 5.0cm E. 6.0cm
19. The length of a displaced pendulum bob which passes its lowest point twice every second,

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assuming $g = 10\text{ms}^{-1}$ is A. 0.25m

B. 0.45m C. 0.58m D. 1.00m

E. 1.2m

20. The inner diameter of a small test tube can be measured accurately using a

A. micrometer screw gauge B. Pair of dividers

C. Meter rule D. Pair of vernier calipers

E. meter screw

21. An object is projected with a velocity of 80ms^{-1} at an angle of 30° to the horizontal. The maximum height reached, assuming $g = 10\text{m/s}^2$, is A. 20m

B. 80m C. 160m D. 320m

E. 40m

22. A cone in an unstable equilibrium has its potential energy,

A. Decreased B. Increased C.

Oscillating D. Unchanged E.

Undulating

23. A car of mass 800kg attains a speed of 25ms^{-1} in 20 seconds. The power developed in the engine is

A. 12.5KW B. 25.0KW C.

1.25MW D. 2.50MW E. 1MW

24. When a ship sails from salt water into fresh water, fraction of its volume above the water surface will

A. Decrease B. Remain the same C.

Increase D. Increase then decrease E. All of the above

25. A machine gun with a mass of 5kg fires a 50g bullet at a speed of 100ms^{-1} . The recoil speed of the machine gun is A. 0.5m/s B.

3.5m/s C. 1m/s D. 2m/s E. 4m/s

ENGLISH

A. In the flowing questions choose the expression or word which best completes each sentence.

1. The student who went home without an exit has apologized ____ his misconduct.

A. On B. At C. About D. For

E. It

2. The man has atoned ____ his sins. A. Upon

B. On C. For D. At E.

Against

3. I am ____ seeing your family. A.

Forward to B. Ahead to C. Forward on D.

Ahead to E. At

4. These folk tales have been landed ____ from generation to generation

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A. In B. At C. Over D. Over

E. Eat

5. The young lovers first met _____ the University of Ibadan Night dancer

A. In B. At C. Inside D. In

course of E. From

6. I have not seen my house master _____ the beginning of this session

A. From B. In C. For D. Since

E. Concerning

7. Get _____ the untimely death of his son

A. Off B. By C. Through

D. Over E. Eat 8.

8. If you keep playing with this door handle, it will get ____

A. lose B. Loose C. lost D.

Loosing E. Renewed

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

9. She was dressed in a gorgeous costume

A. Richly coloured B. Loose C. Badly

sewn D. Tight fitting E. Bad Colour

10. Obi's reaction is too subtle to be understood

A. Violet B. Real C. Clever D. Wild

E. Cold

11. Many people are often deceived by superficial knowledge

A. Cheap B. Shallow C. Attractive D.

Penetrating E. All of the above

12. His subjects rejoiced in the end of his tyrannical rule

A. Cruel B. Long C. Just D.

Peaceful E. Ancient

13. Danqal is a very versatile scholar things

A. Dull B. Clever at his special field C.

Interested in many different things D. Slow

E. lazy

14. Nigerian sailors are very virile

A. Strong and manly B. Vindictive

C. Virtuous D. Vicious and cunning E.

Friendly

15. I have to wade through that stream

A. Walk hurriedly B. Swain

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C. Toddle D. Walk with difficulty

E. Walk up

16. His rise to fame was metoric

A. Well deserved B. Very gradual

C. Very swift D. Too slow E. All of the above

17. Martha came late this morning but she gave plausible excuse

A. Reasonable B. Very interesting

C. Detailed D. Pathetic

E. Stupid

(C) In each of the following questions choose the optio opposite in meaning to the underlined word

18. A tentative date was given

A. definite B. A provisional C. An amicable D. Convincing E. None of the

of the

19. Obi was the hero of the story A. Assassin

B. Villain C. Devil D. Criminate

E. Goliath

20. The man drew a sword as people congregated round him

A. Fled from B. Praised C.

Gathered round D. Mobbed

E. Bent

21. The point you have made is quite apt

A. Helpful B. Irrelevant C.

Illogical D. Insensitive E. All of the above

22. That little boy has become quite chubby

A. Intelligent . B. Tall C. Thin

D. Huge E. Large

23. The action was premeditated

A. Unplanned B. Unnecessary C.

Catastrophic D. Uncoordinated E. Good

24. The boy made flippant remark A. serious

B. well-meant C. A correct D. An

expected E. Yes

25. The weather is getting warmer, so the ice should thaw soon

A. Frost B. Freeze C. Melt D.

Escape E. Run

SOLUTIONS TO MATHS 2007/2008 CONTINUED

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11. $S = a = 1 = 2 = \mathbf{B}$

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

12. $\sin 3000 = \sin (3600 - 600) = \sin 3600 \cdot \cos 600 - \sin 600 \cdot \cos 3600 = (0 \times \frac{1}{2}) - (\frac{3}{2} \times 1) = \frac{3}{2} = \mathbf{B}$

13. For a regular polygon: internal angle + external angle = 1800

$144 + x = 1800$

$X = 1800 - 1440 = 360$

No of sides of regular polygon = $\frac{360}{36} = 10$ sides = **D**

14. $\frac{272}{3} \times \frac{322}{3} = (\frac{33}{2}) \times (\frac{25}{5}) = 32 \times 22 = 36 = \mathbf{A}$

15. $n^2 - 16n + 64 = n^2 - 8n - 8n + 64$

$n = 8$ (twice) – Equal roots = **A**

16. $2c^2 - 11c + 12 = 0$ Using the quadratic equation on

$-(-11) \pm \sqrt{(-11)^2 - 4(2)(12)} = 11 \pm \sqrt{121 - 96} = 11 \pm 5$

$X = 11 \pm 5$ $x = 16$ or $x = 6 = \mathbf{A}$

17. $9 = 3$ is no surd = **D**

18. $4 \times 5 + 1 = 20 + 1 = 21$

$5 - 1 = 4$ $5 + 1 = 6$ $4 = 5 + 1 = \mathbf{B}$

19. $\frac{7}{8} \times \frac{9}{4} = \frac{63}{32}$

$\frac{7}{8} \times \frac{9}{4} = \frac{63}{32} = \frac{7}{8} \times \frac{9}{4} \times \frac{48}{48} = \frac{15}{22} = \mathbf{B}$

20. $x + y = 2$ (1)

$2x - y = 7$ (2) subtracting (1) from (2)

$3x = 9$ $x = \frac{9}{3} = 3$

Substituting the value of x into (1) we have $3 + y = 2$ hence $y = -1 = \mathbf{A}$

21. Range = highest value – lowest value $9 - 0 = 9 = \mathbf{B}$

22. (94, 21) = **D**

23. $\frac{94}{21} = 4.47 = \mathbf{A}$

24. The Median is obtained by rearranging to order and then picking the middle term.

0,1,1,1,1,2,2,4,5,5,5,6,6,6,6,6,8,8,9

The median is 5 = **B**

25. The mode is the most occurring value is 6 = **B**

CHEMISTRY

1. = C 7. D 13. D 19. A 25. D

2. = B 8. D 14. A 20. C

3. = A 9. E 15. A 21. A

4. = A 10. A 16. E 22. C

5. = D 11. C 17. C 23. A

6. = A 12. A 18. E 24. D

PHYSICS

1. Strain = elongation = $L = 6\text{mm}$

Original – length L_0 (10 x 10)

$28 = 0.06 = 6 \times 10^{-2} = \mathbf{A}$

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2. = D 3. = C 4. = D 5. = A

6. Since pressure is constant: $V_1 = V_2 T_1 T_2$

$300 = V_2 \text{ thus } V_2 = 327 \times 300 = 327 = \mathbf{C}$

300 327 300

7. = 160m, $V = 320\text{m/s}$

The echo travels: distance $\times 2 = 2$ and $v = 2f$

$320 = 2 \times f \times 160$ thus $f = 320 = 1\text{Hz} = \mathbf{D}$ 2×160

8. = C 9. C 10. D 11. C 12 A

13. $P = VI \cos$

$10 \times 5 \times \cos 60 = 25\text{W} = \mathbf{D}$

14. $E_k = hv - W$

$W = E_k - hv = 5 - 2 = 3\text{eV} = \mathbf{D}$

15. B 16. C 17. B

18. $V = f \lambda$ and $\lambda = V/f = 20/10 = 2.0\text{cm}$

But distance between adjacent nodes is $2.0/2 =$

$1.0\text{cm} = \mathbf{B}$

19. $T = 2l/g$

$(T/2)^2 = l/g$ $(T/2)^2 = l/10$ and $l = 0.25\text{m} = \mathbf{A}$

20. = D

21. $H = U^2 \sin^2 = 80^2 (\sin 30)^2$

$2g \times 10 = 80\text{m} = \mathbf{B}$

22. = A decreased 23. B 24. A 25. STV

ENGLISH

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

5. = B 6. = D 7. = D 8. = B

9. Gorgeous: very beautiful and attractive; giving pleasure and enjoyment (2) of colours clothes etc) with very deep colours: impressive ANS Richly coloured = A

10. Subtle: not very noticeable or obvious (2) (of a person or their behaving in a clever way and using indirect methods, in order to achieve something ANS Clever = C

11. Superficial: ANS shallow = B

12. Tyrannical: using power or authority over people in an unfair and cruel way ANS cruel = A

13. Versatile = C

14. Virile: strong and full of energy = A

15. Wade: to walk with an effort through something especially water or mud = D

16. Meteoric: achieving success very quickly = C

17. Plausible: reasonable and likely to be true = A

18. Tentative: not definite of certain because you

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- may want to change it later ANS Definite = A
19. Hero: ANS villain = B
20. Congregating round: to come together in a group
ANS gathered round = C
21. Apt: suitable or appropriate in the circumstances
ANS irrelevant = B
22. Chubby: slightly fat in a way that people usually
find attractive ANS thin = C
23. Premeditated: planned in advance ANS
unplanned = A
24. Flippant: showing that you do not take something
as seriously as other people think you should ANS
serious=A
25. Thaw: to turn back into water after being frozen
ANS freeze = B

FUTMINNA 2006/2007 POST UME SCREENING EXERCISE

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

PHYSICS

1. A simple pendulum makes 50 oscillations in one minute. What is the period of oscillation?
A. 0.02s B. 0.20s C. 0.83s D. 1.20s
E. 50.00s
2. A girl whose mass is 55kg stands on a spring weighing machine inside a lift. When the lift starts to ascend, its acceleration is 2ms^{-2} . What will be the reading on the machine? (Take $g = 10\text{ms}^{-2}$)
A. 66kg B. 55kg C. 44kg D. 22kg
E. 11kg
3. A boy pulls a nail from a wall with a string tied to the nail. The string is inclined at an angle of 60° to the wall. If the tension in the string is 4N. what is the effective force used in pulling the nail?
A. 2N B. 3N C. 4N D. 4.3N
E. 8N
4. Which of the following is not a vector quantity?

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- A. momentum B. force C. velocity
D. temperature E. displacement
5. A real image of an object formed by a converging lens of focal length 15cm is three times the size of the object. What is the distance of the object from the lens?
A. 30cm B. 25cm C. 20cm D. 15cm
E. 10cm
6. Which of the following remain(s) unchanged as light travels from one medium to another?
I. speed II. Wavelength III Frequency
A. I only B. II only C. III only D. I and II only E. II and III only
7. A concave mirror of radius of curvature 20cm has a pin placed at 15cm from its pole. What will be the magnification of the image formed?
A. 4.00 B. 2.00 C. 1.33 D. 1.50
E. 0.25
8. The image in a pin-hole camera is always
A. diminished B. enlarged C. upright
D. inverted E. blurred
9. An object weighs 10.0N in air and 7.0N in water. What is its weight when immersed in a liquid of relative density 1.5? A. 4.50N B. 4.67N C. 5.50N D. 6.67N E. 8.50N
10. A converging lens of focal length 5cm forms a virtual image which is 10cm from the lens. How far from the lens is the object? A. 2.0cm B. 3.3cm C. 5.0cm D. 10.0cm E. 15.0cm
11. The count rate of an alpha-particle source is 400 per minute. If the half-life of the source is 5 days, what would be the count rate per minute after 15 days? A. 20 B. 25 C. 50 D. 200 E. 400
12. The nucleon number and the proton numbers of a neutral atom of an element are 238 and 92 respectively. What is the number of neutrons in the atom? A. 330 B. 238 C. 146 D. 119
E. 73
13. In 24 days a radioactive isotope decreases in mass from 64g to 2g. What is the half-life of the radioactive material? A. 0.75 days B. 2.58 days C. 4.00 days D. 4.80 days
E. 6.00 days

14. When an atom gains or loses a charge, it becomes
A. an ion B. an electron C. a neutron
D. a proton E. a deuteron
15. Beta particles are A. electrons B. protons C. neutrons D. helium nuclei E. tritium, nuclei
16. Which of the following has the shortest wavelength?
A. infrared ray B. gamma rays C. ultra violet ray D. radio wave E. visible light
17. The inability of the eye to focus near objects is known as
A. long sight B. astigmatism C. presbyopia D. glaucoma E. short sight
18. A ball is projected horizontally from the top of a hill with a velocity of 20ms^{-1} . If it reaches the ground 4 seconds later, what is the height of the hill? ($g = 10\text{ms}^{-2}$).
A. 20m B. 40m C. 80m D. 160m E. 200m
19. Calculate the resistance of the filament of a lamp rated 240V40W.
A. 2400 B. 36000 C. 7200 D. 14400 E. 28800
20. A cube made of a metal of linear expansivity is warmed through a temperature of t . if the initial volume of the cube is V , what is the increase in volume of the cube?
A. $Vt/3$ B. $Vt/2$ C. Vt D. $2aVt$
E. $3 Vt$

CHEMISTRY

21. When sucrose is warmed with Fehling solution.
A. a silver mirror is produced
B. the turns milky
C. a brick-red precipitate is formed
D. There is no precipitate
E. a blue black coloration
22. Which of the following gases will have the highest rate of diffusion under the same conditions ($H = 1, C = 12, O = 16, S = 32, Cl = 35.5$)
A. O_2 B. C_{12} C. HC_1
D. H_2S E. CO_2
23. Which of the following involves the decomposition of a sugar by enzymic action?
A. Esterification B. Fermentation C.

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Dehydration D. Polymerization E.

Saponification

24. When iron rusts, it undergoes

A. Deliquescence B. Chemical Decomposition

C. hydrolysis D. Redox reaction E.

Combustion

25. Hydrogen is used for the following except

A. manufacturing of ammonia

B. synthesis of hydrochloric acid

C. extinguishing fire

D. conversion of coal to petrol

E. manufacture of margarine

26. Petrol can be obtained from diesel by

A. distillation B. cracking C.

polymerization D. dehydrogenation

E. catalysis

27. The following metals are attracted by electrolytic method except

A. potassium B. calcium C.

sodium D. tin E. magnesium

28. The complex salt formed when aluminum dissolves in sodium hydroxide solution is

A. $\text{Na}_3\text{Al}(\text{OH})_4$ B. $\text{Na}_2\text{Al}(\text{OH})_3$ C.

$\text{NaAl}(\text{OH})_3$ D. $\text{Na}_4\text{Al}(\text{OH})_4$ E.

$\text{NaAl}(\text{OH})_4$

29. Which of the following is a waste product in the solvay process for the manufacture of sodium trioxocarbonate(IV)?

A. Ammonium chloride B. brine C.

limestone D. calcium oxide E.

calcium oxide

30. Which of the following is not a naturally occurring Iron ore?

A. FeCl_2 B. Fe_2O_3 C. Fe_2O_3 D.

FeCO_3 E. FeS_2

31. Which of the following materials cannot be extracted from its ore by using carbon or carbon (II) oxide as the reducing agent? A. Cu B. Zn

C. Al D. Pb E. Fe

32. Chlorine is used in water treatment as

A. a germicide B. a decolorizing agent C. an anti-oxidant D. a coagulating agent E. an

aerating agent

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33. The properties of electrovalent compounds include the following except
- A. a high melting and boiling point
 - B. conduction of electricity in the molten state
 - C. high volatility at room temperature
 - D. ionization of aqueous solution
 - E. decomposition of their solutions by electric current
34. Alkanes are used mainly
- A. in the production of plastics
 - B. as domestic and industrial fuels
 - C. in the textile industry
 - D. in the hydrogenation of oils
 - E. as fine chemicals
35. Which of the following solids has a network structure?
- A. diamond
 - B. iodine
 - C. sulphur
 - D. graphite
 - E. iron
36. Which of the following separation is routine applied in the petroleum industry?
- A. filtration
 - B. chromatography
 - C. fractional crystallization
 - D. evaporation
 - E. fractional distillation
37. Which of the following observation is not correct about the reaction of sodium metal with cold water?
- A. The reaction is spontaneous
 - B. the reaction is endothermic
 - C. hydrogen is produced
 - D. the sodium melts and dissolves
 - E. the resultant solution is alkaline
38. The formula $(\text{CH}_3)_3\text{COH}$ is that of
- A. polyhydric alcohol
 - B. secondary alkanol
 - C. tertiary alkanol
 - D. primary alkanol
 - E. trihydric alkanol
39. What is the number of oxygen atoms in 32g of the gas? ($O = 16, L = 6.0 \times 10^{24} \text{ mol}^{-1}$).
- A. 3.2×10^{23}
 - B. 6.0×10^{23}
 - C. 1.2×10^{24}
 - D. 1.60×10^{24}
 - E. 2.0×10^{24}
40. The ionic radii of metals are usually
- A. greater than their atomic radii
 - B. unaffected by the charge of the ion
 - C. less than their atomic radii
 - D. greater than those of non-metals
 - E. the same as their atomic radii

ENGLISH

From the words lettered A to E below each of the following sentences, choose the group of words that is nearest in meaning to the underlined

expression as it is used in the sentence.

41. She tried to settle the quarrel but the man remained obstinate to listen to her.
A. offensive B. angry C. stubborn D. unstable E. impolite
42. Okon attempted to entice Eno with the promise of a handsome sum of money
A. deceive B. enchant C. force D. trick E. tempt
43. I am very proud to speak before this august assembly.
A. Ignominious C. monthly D. untrue E. popular
44. It is absurd to suggest that Tunde should marry that saucy lady.

A. pitiable B. hopeless C. humorous D. untrue E. ridiculous

45. The principal's orders are imperative. A. lenient B. authoritative C. genuine D. E. necessary
46. The suspect was made to walk in front of the anxious crowds.
A. surprised B. astonished C. engrossed D. curious E. questionable
47. The lawyer's argument of the case was exhaustive
A. Interesting B. exaggerating C. exhilarating D. thorough E. fascinating
48. The superintendent was appalled by the attitude of some of the employees towards their work.
A. annoyed B. disappointed C. shocked D. provoked E. depressed
49. Death is inevitable for a man. A. unavoidable B. essential C. necessary D. immoral E. imminent
50. The decision taken by the panel is irrevocable.
A. irreversible B. unexpected C. acceptable D. irresponsible E. unacceptable

From the words or group of words lettered A to E, choose the one that best completes each of the

following sentences

51.is the owner of this pair of shoes? A. who
B. whom C. which D. whose
E. when
52. My uncle is an expert Mechanical engineer
A. at B. in C. with D. for
E. on
53. The PTA meeting did not adjourn until it had
discussed all the matters placed ZZ it
A. by B. with C. before D. over
E. on
54. Nobody was surprised that the thief was
convicted ZZ. All the charges
A. on B. with C. of D. over
E. for
55. It has been rough so far ZZ? A. hasn't it B. B.
hadn't it C. isn't it D. wasn't it E. haven't it
56. The master says he's accountable Z the
president, and nobody else A. from B to C. with
D. by E. for
57. You were punished because youlast week
without permission.
A. ought not to have traveled
B. must not have travelled
C. Ought not to travel
D. will not have travelled
E. ought to have travelled
58. The president's speech ZZ At 7pm yesterday.
A. is broadcast B. has been broadcast
C. were broadcast D. was
broadcast
59. She Z... .before I entered the office.
A. has to be questioned
B. has been questioned
C. have been questioned
D. had been questioned
E. is being questioned
60. The suspectwhen I entered the office.
A. has been questioned
B. have been questioned
C. was being questioned
D. is being questioned
E. will be questioned

MATHEMATICS

61. The angle of the sector of a circle of diameter
8cm is 135° . Find the area of the sector. (TC= $22/7$)
A. $3/20$ B. $1/4$ C. $1/4$ D. $3/10$

E. $\frac{3}{4}$

62. Calculate, correct to three significant figures, the length of an arc that subtends an angle of 70° at the centre of the circle of radius 4cm. ($\pi = \frac{22}{7}$)

- A. 2.44cm B. 4.89cm C. 9.78cm
D. 25.1cm E. 50.3cm

63. A number is chosen at random from the set $\{1,2,3,\dots,9,10\}$. What is the random probability that the number is greater than or equal to 7? A. $\frac{1}{10}$

- B. $\frac{3}{10}$ C. $\frac{2}{5}$ D. $\frac{3}{5}$
E. $\frac{7}{10}$

64. A fair die is rolled once. What is the probability of obtaining 4 or 6?

- A. $\frac{1}{12}$ B. $\frac{1}{6}$ C. $\frac{1}{3}$ D. $\frac{1}{2}$
E. $\frac{2}{3}$

65. $S = \{1,2,\dots,5,6\}$, $T = \{2,4,5,7\}$ and $R = \{1,4,5\}$, find $\{S \cap T\} \cap R$

- A. $\{1,4,5\}$ B. $\{2,4,5\}$ C. $\{1,2,4,5\}$ D.
 $\{2,3,4,5\}$ E. $\{1,2,3,4,5\}$

66. Simplify $\frac{3}{4} \times \frac{1}{4} \times (\frac{1}{2} - \frac{2}{3})$ A. $\frac{7}{30}$

- B. $\frac{7}{24}$ C. $\frac{9}{25}$ D. $\frac{1}{2}$
E. $\frac{18}{25}$

67. Solve the inequality $3m + 3 > 9$ A. $m > 2$

- B. $m > 3$ C. $m > 6$ D. $m > 6$
E. $m > 12$

68. Convert 89 in base ten to a number in base two

- A. 1101001 B. 1011001 C.
1001111 D. 101101 E. 1101

69. The n th term of a sequence is given by $(-1)^{n-1}$, find the sum of the second and third terms

- A. -2 B. 1 C. 2 D. 6 E. 12

70. In an arithmetic progression, the first term is 2 and the sum of the 1st and 6th terms is 614. What is the 4th term? A. 12 B. $\frac{91}{2}$

- C. 8 D. 7 E. $\frac{51}{2}$

71. While doing his Physics practical Chioma recorded a reading of 1.12cm instead of 1.21cm calculate his percentage error. A. 1.17%

- B. 6.38% C. 7.44% D. 8.05%
E. 9.00%

72. From the top of a building 10m high, the angle of depression of a stone lying on the horizontal, ground is 69° . Calculate, correct to one decimal

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place, the distance of the stone from the foot of the building.

A. 3.6m B. 3.8m C. 6.0m

D. 9.3m E. 26.1m

73. Factorize $3a^2 - 11a + 6$

A. $(3a-2)(a-3)$ B. $(2a-2)(a-3)$ C. $(3a-$

$2)(a + 3)$ D. $(3a + 2)(a - 3)$ E. $2a -$

$3)(a + 2)$

74. Solve the equation $3a + 10 = a^2$ A. 5, 2

B. -5, 2 C. 10, 0 D. 5, -2

E. -5, -2

75. The common ratio of a geometrical progression is 2. If the 5th term is greater than the 1st term by

45, find the 5th term. A. 3 B. 6

C. 45 D. 48 E. 90

76. Which of the following about a rhombus may not be true?

A. The diagonals are equal

B. the diagonals bisect the angles through they pass

C. the diagonals bisect each other

D. the adjacent sides are equal E. opposite angles are equal

77. Evaluate $\log_2 25 + \log_2 32 - \log_2 108$

A. 0.2 B. 2 C. 100 D. 409

E. 490

78. Construct a quadratic equation whose roots are $-1/2$ and 2.

A. $3x^2 - 3x + 2 = 0$ B. $3x^2 + 3x - 2 = 0$ C. $2x^2 +$

$3x - 2 = 0$ D. $2x^2 - 3x + 2 = 0$ E. $2x^2 - 3x - 2 =$

0

79. What must be added to the expression $x^2 - 18x$ to make it a perfect square?

A. 3 B. -9 C. 36 D. -72

E. 81

80. Solve the equation $m/3 + 1/2 = 3/4 + m/4$.

A. -3 B. -2 C. 2

D. 3 E. 4

SOLUTIONS TO POST UME 2006/2007

PHYSICS

1. Period $T = t/n = 60/50 = 1.20s = \mathbf{B}$

2. = B There is no change in mass

3. Effective force $F_x = F \cos 60 = 4 \cos 60 = 4(0.5) =$

$2N = \mathbf{A}$

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4. Temperature = **D**

5. $M = v u = 3$; $v = 3u$ is positive for a converging lens. Distance of real object and real image are positive

$$1/v + 1/u = 1/f \text{ thus } 1/3u + 1/u = 1/15 \Rightarrow 4/3u = 1/5$$

$$u = 60/3 = 20\text{cm} = \mathbf{C}$$

6. =A

$$7. = +v/2 = 20/2 + 10\text{cm}, u = 15\text{cm}$$

$$1/u + 1/v = 1/f \Rightarrow 1/v = 1/f - 1/u = 1/10 - 1/15 =$$

$$1/30 \text{ and } v = +30\text{cm}; v \text{ is positive so image is real.}$$

$$\text{Magnification } m = v/u = 30/15 = 2.00 = \mathbf{B}$$

8. = E

9. Rel. Density = weight – in – air

Weight – of – equal – volume – of – water

$$1.5 = 10/b; 1.5b = 10 \text{ and } b = 6.67\text{N} = \mathbf{D}$$

$$10. 1/v + 1/u = 1/f \Rightarrow 1/u = 1/f - 1/v = 1/5 - 1/10 = 1/10. u = 10\text{cm} = \mathbf{D}$$

$$11. 15/5 = 3 \quad 400/2 = 200 \text{ 1st half of decay} = 5\text{days}$$

$$200/2 = 100 \text{ 2nd half of decay} = 5\text{days} \quad 15 \text{ days}$$

$$100/2 = 50 \text{ 3rd half of decay} = 5\text{days} = \mathbf{C}$$

12. Proton and neutron constitute the nucleon.

$$\text{Hence neutrons} = \text{Nucleon} - \text{Proton} = 238 - 92 =$$

$$146 = \mathbf{C}$$

$$13. 14/2 = (1/2)^{24/t}$$

$$1/2 \Rightarrow 3.2 = (0.5)^{24/t} \quad 1/2$$

$$\text{Log } 3.2 = \text{log } 0.5^{24/t}$$

$$1/2 \Rightarrow 1.51 = 24/t \cdot 1/2 \quad (-0.3010)$$

$$t \cdot 1/2 = 24 \times 0.3010 = 4.8 \text{ days} = \mathbf{D}$$

$$1.51$$

14. A 16. B

15. A 17. A

$$18. S = ut + \frac{1}{2}gt^2 = 20.4 + \frac{1}{2} \cdot 10 \cdot 16$$

$$S = 80 + 80 = 160\text{m}$$

$$19. P = IV = V^2/R = I^2R \text{ where } V = 240, P = 4\text{W}$$

$$R = V^2/P = 240^2/4 = 14400 = \mathbf{D} \quad P = 40$$

20. Volume Expansivity = $V_2 - V_1$ $V_1 t$

$$V_2 = V_1, \text{ where } = 3 \text{ Hence } 3 V_1 t = V_2 t$$

$$V_2 = 3 V_1 t = \mathbf{E}$$

CHEMISTRY

21. – 28. E 35. D

22. A 29. B 36. E

23. B 30. A 37. B

24. B 31. C 38. C

25. C 32. A 39. C

26. B 33. C 40. C

27. D 34. B

ENGLISH

41. Obstinate (often disapproving) refusing to change your opinions, way of behaving etc. when other people try to persuade you to; showing this:
ANS stubborn = C
42. Entice: to persuade somebody/something to go somewhere or to do something, usually by offering them something ANS tempt = E
43. august: (Note this is different from August – the 8th month) Impressive, making you feel respect ANS popular = E
44. Absurd: completely ridiculous, not logical and sensible ANS ridiculous = E
45. Imperative: very important and needing immediate attention or action (2) expressing authority: expressing an order ANS authoritative = B
46. Anxious: feel worried or nervous ANS curious = D
47. Exhaustive: very thorough, looking at a every detail ANS thorough = D
48. Appalled: feeling or showing horror or disgust at something unpleasant or wrong ANS shocked = C
49. Inevitable: that you cannot avoid or prevent ANS unavoidable = A
50. Irrevocable: that cannot be changed; final ANS irreversible = A

51. Note: 'whom' is used instead of 'who' as the object of a verb or proposition while who is usually used as the object pronoun, especially in questions. It is much more natural to use who and put the preposition at the end of the sentence ANS who = A
52. B 56. B 60. C
53. C 57. A
54. C 58. D
55. A 59. D

MATHEMATICS

61. Area of a sector $A = \frac{x}{360} \times \pi r^2 = \frac{135}{360} \times \pi \times 22^2 \times \frac{42}{7} = 186\pi$
62. Length of arc $= \frac{x}{360} \times 2\pi r = \frac{70}{360} \times 2 \times \pi \times 22 \times 4 = 4.89\pi$
= B
63. $x > 7(8,9,10) = P(x) = 3$

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$$x = 7(7) = P(x) = 1$$

$$x > 7 = 3 + 1 = 4 = 2$$

$$10 \ 10 \ 10 \ 5 = \mathbf{C}$$

$$64. x = 4 = 1 \ x = 6 = 1 \ P(4 \text{ or } 6) = 1 + 1 = 2 = 1$$

$$6 \ 6 \ 6 \ 6 \ 3 = \mathbf{C}$$

$$65. S = \{1,2,3,4,5,6\}; T = \{2,4,5,7\}; R = \{1,4,5\}$$

$$(S \cap T) = \{2,4,5\}; (S \cap T) \cap R = \{1,2,4,5\} = \mathbf{C}$$

$$66. = \mathbf{D}$$

$$67. 3m + 3 > 9; 3m > 9 - 3; 3m > 6; \text{ and } m > 2 = \mathbf{A}$$

$$68. = \mathbf{B}$$

$$69. \text{Second term} = (-1)^{2-2} \cdot 2^{2-1} = 1 \cdot 2 = 2$$

$$\text{Third term} = (-1)^{3-2} \cdot 2^{3-1} = -4$$

$$\text{Hence their sum is } 2 + (-4) = -2 = \mathbf{A}$$

$$70. a = 2, a + U_6 = 614 = 2 + U_6 \text{ and } U_6 = 612$$

$$U_6 = a + (n - 1)d$$

$$612 = 2 + (6 - 1)d; 612 - 2 = 5d; \text{ and } d = 610/5 = 122$$

$$\text{The fourth term } U_4 = 2 + (4 - 1)122 = 368 \text{ Z Question}$$

is mixed up, but you can use this method

$$71. 1.21 - 1.12 \times 100 = 7.44\% = \mathbf{C} \ 1.21$$

$$72. \tan 21 = x; x = 10 \tan 21 = 3.8 = \mathbf{B}$$

$$73. 3a^2 - 11a + 6; 3a^2 - 9a - 2a + 6 = (3a - 2)(a - 3) = \mathbf{A}$$

$$74. 3a - 10 = a^2; a^2 - 3a - 10$$

$$a(a + 2) - 5(a - 2)$$

$$a = 5 \text{ or } a = -2 = \mathbf{D}$$

$$75. r = 2, U_5 - a = 45; ar^4 - a = 45$$

$$a(24 - 1) = 45; \text{ hence } 15a = 45 \text{ and } a = 3$$

$$U_5 = ar^4 = 3(24) = 48 = \mathbf{D}$$

$$76. \mathbf{A}$$

$$77. \log_{10} 25 + \log_{10} 32 - \log_{10} 8 = \log_{10} 25 \times 32 = \log_{10} 800$$

$$\log_{10} 100 = 2 \log_{10} 10 = 2 = \mathbf{B}$$

$$78. x = -\frac{1}{2}, x = 2$$

$$(x + \frac{1}{2})(x - 2) = 0; x^2 - 2x + x(\frac{1}{2}) - 1 = 0$$

$$x^2 - \frac{3}{2}x - 1 = 0 \text{ Multiply through by}$$

$$2x^2 - 3x - 2 = 0 = \mathbf{E}$$

$$79. b^2 - 4ac = 0; 182 - 4 \cdot 1 \cdot c = 0 \text{ square both sides}$$

$$182 - 4c = 0; 324 - 4c = 0 \text{ hence } 324 = 4c \text{ and } c = 81$$

$$= \mathbf{E}$$

$$80. m + 1 = 3 + m$$

$$3 \ 2 \ 4 \ 4 \text{ Multiplying through by 12 gives}$$

$$4m + 6 = 3(3) + 3m$$

$$4m - 3m = 9 - 6$$

$$m = 3 = \mathbf{D}$$

**FUTMINNA 2005/2006 POST UME(ADMISSION SELECTION) TEST
ENGLISH LANGUAGE**

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

1. Legislators must be trained to _____ the truth
A. disguise B. discern C. digest D. disturb E. distort
2. As it holds true that, unless you trained your body you cannot be an athlete, so also unless you train your _____ you cannot be a _____
(A) kicking footballer (B) voice-choirmaster
(C) mind-scholar (D) courage-hero (E) arms swimmer
3. Never in the history of human conflict has so much been owed by so many to so few.
(A) many people owed much money of the end of the war
(B) A handful of people saved the lives of a nation
(C) A few people did a lot of things gratis
(D) This conflict caused the largest ransom ever demanded
(E) Very little was owed by anyone to anybody

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

4. After the wife had covered her misdeeds by prevaricating on several occasions the poor husband accused her point-blank of adultery
(A) bluntly (B) pointedly (C) emphatically (D) unreservedly (E) unmistakingly
5. When a man is immune to an illness, he is
(A) opposed to it (B) attached it (C) hasted by it (D) protected against it (E) addicted to it
6. In a civilized society, it is unseemly to emit a loud belch at the end of a meal
(A) noisy (B) annoying (C) stupid (D) outrageous (E) impolite

Choose the appropriate option to fill the gap in the following sentences

7. The principal was able to establish a functional language laboratory for his school because he acted _____ the advice of experts on the subject
(A) through (B) at (C) from (D) on (E) by
8. The prefect came to the class five minutes after

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the lesson ____

(A) has started (B) had started (C) have started (D) is started (E) has been started

9. Grace must be allergic ____ smoke because any she sits by someone who is smoking, she sneezes.

(A) to (B) from (C) for (D) with (E) by

Fill in the right word/phrase

10. He ____ the book to the library last week

(A) has returned (B) had returned (C) was returned (D) returned (E) was to be returning

11. The police man was sent to ____ the allegation made by the man

(A) Investing (B) examine (C) probe (D) enquire (E) observe

Which of the options express the same ideas as the one in quotes

12. To beat down the 'price' is to

(A) flog the price (B) reduce the price (C) beat the salesman (D) attack the seller (E) control the price

Fill in the blank spaces in the following sentences making use of the best of the two options

13. For their part in the successful ____ the mutineers were court-martialled.

(A) coopes (B) coupes (C) coupe (D) coup (E) coupes

14. The way to stop some frivolous publications is to ____ the press

(A) gag (B) shackle (C) fetter (D) handcuff (E) blind

Choose the option opposite in meaning to the word underlined

15. To most people last Christmas was an austere period

(A) prosperous (B) harsh (C) severe (D) four (E) stern

16. Chidi is naturally taciturn (A) friendly

(B) cheerful (C) dumb (D) lively (E) garrulous

Choose the option nearest in meaning to the

underlined

17. The salesman tried to pull the wool over my
(A) force me to buy his goods
(B) offer me cotton wool
(C) make me buy his wool
(D) dupe me
(E) cover my eyes with wool.
18. The legislator has decided to play second fiddle after he had been walked out of the Assembly for violating basic procedures of the House. This means that the Legislator has decided to
(A) oppose every motion in the House
(B) Support every motion in the House
(C) condemn every motion
(D) support the lead given by others
(E) Become active in the House
19. Select the wrongly spelt word (A) disappointed (B) embarrassed (C) equipped (D) rhythm (E) restaurant
20. Select" the wrongly spelt word (A) quite (B) believe (C) proceed (D) precede (E) opportunity

CHEMISTRY

21. When air which contains the gases: oxygen, nitrogen, carbon dioxide, water vapour and the rare gases, is passed through alkaline pyrogallot and then over quicklime, the only gases left are:
(A) nitrogen and carbondioxide
(B) the rare gases
(C) nitrogen and oxygen
(D) nitrogen and the rare gases
(E) nitrogen, carbondioxide and the rare gases.
22. When large hydrocarbon molecules are heated at high temperature in the presence of a catalyst to give smaller molecules, the process is known as
(A) disintegration (B) polymerization
(C) cracking (D) degradation
(E) distillation
23. When each of the nitrates of potassium, magnesium and iron is heated
(A) all the nitrates decompose to their oxides
(B) the nitrate of magnesium gives the nitrite and oxygen
(C) the nitrates of magnesium and iron give the oxides
(D) the nitrate of iron gives the nitrite and oxygen
(E) the nitrate of the magnesium is not decomposed
24. Helium atoms are chemically unreactive because
(A) there are no electrons around the nucleus
(B) the number of protons equals the number of

electrons

(C) there are equal number of protons and neutrons in the nucleus

(D) the outer electron shell is completely filled

(E) the atoms contain only protons

25. How many grams of HBr would exactly be required to react with 2g of propyne? (C = 12, H = 1, Br = 80)

(A) 4.1g (B) 6.1g (C) 8.1g (D)

10.1g (E) 16.2g

26. Under high pressure, real gases do not obey gas laws because their molecules

(A) have become more energetic

(B) have become less energetic

(C) have become smaller in size

(D) decompose into atoms

(E) start repelling each other

27. Which of the following statements is an exception in the assumptions of the kinetic theory of gases?

(A) Gases are composed of many elastic particles

(B) the particles are of negligible size

(C) the particles are in constant random motion

(D) the particles are of negligible mass

(E) the particles collide with each other

28. 5.00g of hydrated salt of barium when heated to a constant weight gave 4.26g of anhydrous salt with a molecular weight of 208. The number of molecules of water of crystallization in the hydrated salt is

(A) 10 (B) 7 (C) 5 (D) 2

29. Oxidation is the process of:

(A) gain of electrons

(B) loss of electrons

(C) gain of hydrogen

(D) loss of oxygen

(E) addition of an electropositive element to a substance

30. Which of the following statement is NOT true of the electrovalent compounds?

(A) They are solids

(B) They do not vaporize easily

(C) they usually dissolve in water

(D) the elements orbiting the compounds normally have their valence electrons in a shared state

(E) they conduct electricity

31. If concentrated sulphuric acid is added to sugar and warmed gently, the sugar changes from white to brown and finally to a black mass of carbon. In this reaction, concentrated sulphuric acid is acting as:

(A) a dyeing agent (B) an oxidizing agent (C) a dehydrating agent (D) a reducing agent (E) a hydrolyzing agent

32. When heat is absorbed during a chemical reaction, the reaction is said to be

(A) thermodynamic (B) exothermic (C) isothermal (D) endothermic (E) thermostatic

33. The pH of four solutions W, X, Y, Z are 4,6,8,10, respectively therefore

(A) none of these solutions is acidic
(B) the pH of Y is made more acidic by addition of distilled water
(C) Z is the most acidic solution
(D) W is the most acidic solution (E) X is neutral

34. Which of the following contains two amphoteric oxides?

(A) Sodium oxide, Zinc Oxide, Magnesium oxide
(B) Aluminum oxide, calcium oxide, Zinc oxide
(C) Potassium oxide, lithium oxide, Carbon dioxide
(D) Silver oxide, Lead oxide, Sodium oxide
(E) Sulphur dioxide, Aluminum oxide, Carbon monoxide

35. 50cm³ of hydrogen are sparked with 20cm³ of oxygen at 100°C and 1 atmosphere. The total volume of the residual gases is (A) 50cm³

(B) 10cm³ (C) 40cm³ (D) 30cm³ (E) 70cm³

36. When ammonium, potassium and Calcium carbonates are each separately heated

(A) none of them will decompose
(B) each of them will decompose to give carbon dioxide and the respective oxide
(C) ammonium carbonate and potassium carbonate will not decompose
(D) only ammonium carbonate and calcium carbonate will decompose to carbon dioxide and the respective oxide
(E) ammonium carbonate will decompose to

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glycocarbon dioxide, water and ammonia

37. 500cm³ oxygen was collected over water at 30°C and 752mmHg pressure. What is the volume of dry oxygen at STP? (Vapour pressure of water at 30°C = 32mmHg)

(A) 475cm³ (B) 415cm³ (C) 586cm³ (D) 500cm³ (E) 427cm³

38. Which of the following statements is true?

(A) Metals conduct electricity while non-metals do not

(B) Metals have high density, non metals have low density

(C) Metals form acid oxides, non-metals are below hydrogen

(E) Metals lose electrons while non metals gain electrons during normal reactions

39. In the reaction of oxygen with hydrogen to produce water, which of the following statements is true?

(A) One atom of hydrogen reacts with two atoms of oxygen to give one molecule of water

(B) Two atoms of hydrogen react with two atoms of oxygen to give two molecules of water

(C) One molecule of oxygen reacts with one molecule of hydrogen to give two molecules of water

(D) One molecule of hydrogen reacts with two molecules of oxygen to give three molecules of water

(E) One molecule of oxygen reacts with two molecules of oxygen to give two molecules of water

40. The number of atoms in one mole of a substance is equal to:

(A) the atomic number

(B) the Avogadro number

(C) the gas constant

(D) the number of neutrons

(E) the number of electrons

MATHEMATICS

41. Simplify $25/12 - 17/8 \times 6/5$ (A) $1/6$

(B) $13/20$ (C) $11/20$ (D) $9/4$

(E) $3/5$

42. Make c the subject of the equation: $a(b + c) +$

(5/d) – 2

(A) $ad - b + 2d$ (B) $ab + 5 - 2d$ (C) $2d - 5 - ad$ (D) $2d - 5 - adb$ (E) None

43. On each market day Mrs. Bassey walks to the market from her home at a steady speed. This journey normally takes her 2 hours to complete. She finds, however, that by increasing her usual speed by 1km/hr she can save 20 minutes. Find her usual speed in km/hr. (A) $12/3$ (B) 2

(C) 5 (D) 6 (E) 10

44. The ratio of the areas of similar triangles is necessarily equal to

- (A) The ratio of the corresponding sides
- (B) The ratio of the squares on corresponding sides
- (C) The ratio of the corresponding heights of the triangles
- (D) half the ratio corresponding heights of the triangles
- (E) the ratio of the corresponding bases to the heights of the triangles.

45. A man and wife went to buy an article costing N400. the woman had 10% of the cost and the man 40% of the remainder. How much did they have altogether? (A) N 216 (B) N200 (C) 184 (D) N 144 (E) N100

46. The weights of 30 new-born babies are given as follows:

6,9,5,7,6,7,5,8,9,5,7,5,8,7,5,6,5,7,6,9,9,7,8,8,7,8,9,8,

the mode is (A) 6 (B) 5

(C) 8 (D) 7 (E) 10

47. What factor is common to all the expressions $x^2 - x$, $2x^2 + x - 1$ and $x^2 + 17$

(A) x (B) $x - 1$ (C) $x + 1$ (D) No Common Factor (E) $(2x - 1)$

48. Simplify $\log_{10} 0 - \log_{10} 4$ (A) $\log_{10} 2$

(B) $\log_{10} 8$ (C) 0 (D) $\log_{10} 4$ (E) 1

$\log_{10} 4 - \log_{10} 2$

49. If $f(x - 2) = 3x^2 + 4x + 1$. find $f(1)$

(A) 8 (B) 40 (C) 7 (D) 32 (E) 21

50. Given that $p:g = 1/3 : 1/2$ and $q:r = 2/5 : 4/7$, find $p:r$ (a) 4:105 (B) 7:15 (C) 20:21

(D) 2:36

51. If x is jointly proportional to the cube of y and the fourth power of z . in what ratio is x increased or decreased when y is halved and z is double?

(A) 4:1 increase (b) 2:1 increase (c) 1:4 decrease (d) 1:1 no change (e) 3:4 decrease

52. If $x + 2$ and $x - 1$ are factors of the expression $Lx^3 + 2kx^2 + 24$, find the values of L and k .

(A) $L = 6, k = -9$ (b) $L = -2, k = 1$ (C) $L = 2, k = -1$ (D) $L = 6, k = 1$ (E) $L = 6, k = 0$

53. The value of $(0.03)^3 - (0.02)^3$ is (A) 0.019

(B) 0.0019 (C) 0.00019 (D) 0.000019

(E) 0.000035

54. PQRS is a cyclic quadrilateral with PQ as diameter of the circle. If $\angle PQS = 150^\circ$ find $\angle QRS$

(A) 75° (b) $37\frac{1}{2}^\circ$ (c) $127\frac{1}{2}^\circ$

(D) 105° (e) none of the above

55. Which is the values of the variable x , (a) $x = 3$, (C) $x = 9$, satisfy the inequalities $0 < x + 3 < 2x - 1$

A. (a), (b), (c), B. (b) c only C. (c) only

D. none of (a), (b), (c) E. none of the

choices above

56. Write down the number 0.0052048 correct to three significant figures

A. 0.005 B 0.00052 C. 0.00520 D.

5.2048 E. 5204

57. P and Q are fixed points and x is a variable point

which moves so that angle $PXQ = 45^\circ$ what is the

locus of X ? (A) A pair of straight lines parallel to PQ

(B) the perpendicular bisector of PQ

(C) an arc of a circle passing through P and Q

(D) a circle with diameter PQ

(E) the bisector of angle PXQ

58. A sector of a circle is bounded by two radii 7cm long and arc length 6cm. find the area of the sector.

A. 42cm^2 B. 3cm^2 C. 21cm^2 D.

24cm^2 E 12cm^2

59. The currency used in a country is matimalik

(M) and is of the base seven. A lady in that country

bought 4 bags of rice at M56 per bag and 3tins of

milk at m4 per tin. What is the total cost of the

items she bought?

A. M246 (7) B. M242 (7) C.

M236 (7) D. M336 (7)

60. If $0.0000152 \times 0.00042 = A \times 10^8$, where $1 < A$

< 10 , find A and B

(A) $A=9, B=6.38$ (B) $A=6.38, B = -9$ (C)

$A=6.38, B=9$ (D) $A=6.38, B=-1$ (E) $A=6.38, B=1$

PHYSICS

61. Which of the following is true for the image formed by a convex mirror?

I. The image is always virtual II. The image is always erect III. The image is never magnified

IV. The image is never magnified V. the focal length is negative

A. I only B I and II only C. II and III only D I, II, III and IV only E All five

62. Which of the following statement is true? The reading of pressure on mercury diameter is independent of: (A) the cross sectional area of the tube

(B) the atmospheric pressure of the tube

(C) the density of mercury

(D) the temperature of mercury

(E) the acceleration due to gravity

63. In electrolysis experiment, a cathode of mass 5g is found to weight 5.01g after a current of 5 A flows for 50sec. what is the electrochemical equivalent of the deposited substance?

(A) 0.00004g/C (B) 0.00002g/C (C)

0.02500d/C (D) 0.05000g/C (E) 0.00001g/C

64. A capacitor and a resistor are connected in series with each other and in negligible internal resistance. The potential difference across the terminals of the capacitor is:

(A) twice the e.m.f of the accumulator

(B) less than the E.M.F by the potential drop across the resistor

(C) zero

(D) the same as the e.m.f

(E) greater than the e.m.f

65. A weight of 1000 grams hangs from a lever 20cm to the right of the fulcrum. At the left is 500 gram weight 20cm from the fulcrum, and a 200gram weight x cm away from the fulcrum. What is the value of x that will make the lever balanced?

(A) 50cm (B) 20cm (C) 10cm

(D) 30cm (E) 70cm

66. A magnetic needle is suspended first at earth's

north magnetic pole and at a point on the magnetic equator, the respective angles between the needle and the horizontal are:

(A) 0° and 0° (B) 60° and 60° (C) 90° and 90° (D) 90° and 0° (E) 0° and 90°

67. Which of the following is NOT a vector quality?

(A) Force (B) altitude (C) weight (D) displacement (E) acceleration

68. A man of mass 50kg ascended a flight of stairs 5m high in 5 seconds. If acceleration due to gravity is 10m/s²: (A) 100W (B) 200W (C) 250W

(D) 400W (E) 500W

69. A body rolls down a slope from a height of 100m. Its velocity at the foot of the slope is 20m/s. What percentage of its essential potential energy is converted into kinetic energy:

(A) 40% (B) 35% (C) 20% (D) 15%

70. As a result of air at the top of a barometer the height of the mercury column is 73.5cm when it should be 75.0cm the volume of the space above the mercury is 8.0cm³. Calculate the correct barometric height when the barometer reads 74cm and the volume of the space above the mercury is 6.0cm³.

(A) 72.0cm (B) 74.5cm (C) 75.1cm (D) 76.0cm

71. 22,000J of heat is required to raise the temperature of 1.5kg of paraffin from 20°C to 30°C. Calculate the specific heat capacity of paraffin:

(A) 14666 J/kg-1 (B) 2933 J/kg-1 (C) 40400 J/kg-1 (D) 5886 J/kg-1

72. An object is placed 30cm from a concave mirror of focal length 15cm. The linear magnification of the image produced is: (A) 0 (B) 2/3

(C) 1 (D) 2 (E) 3

73. An electric cell has an internal resistance of 20Ω. A current of 0.5A is found to flow when a resistor of 50Ω resistance is connected across it. What is the electromotive force of the cell

(A) 5volts (B) 3.5volts (C) 2.5volts (D) 1 volt (E) 10 volt

74. A concave lens of focal length 20cm forms an image 1/2 the size of the object. The object distance is;

(A) 150cm (B) 100cm (C) 60cm (D) 60cm (E) None of the above

75. Which of the following electromagnetic waves

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length?

- (A) Radio waves (B) x-rays (C) infra-red (D) blue light (E) ultra violet

76. Which of the following statements is correct?

Silvered walls of a vacuum flask are used to prevent:

- (A) Heat loss due to conduction
- (B) vacuum loss
- (C) heat entry into the inner flask due to convection
- (D) heat loss due to radiation
- (E) heat loss due to convection

77. The point beyond which a stretch spring does not return to its original length is called the:

- (A) Breaking point (B) elastic limit (C) spring constant (D) elasticity point (E) release point

78. The range of wavelengths of visible spectrum is 400nm – 700nm the wavelength of gamma rays is:

- (A) Longer than 700nm
- (B) shorter than 700nm but longer than 400nm
- (C) 550nm
- (D) shorter than 400nm
- (E) infinite

79. Which of the following arrangements in the sequence show can be used to obtain a pure spectrum of white light?

- (A) source, slit, converging lens, prism, converging lens, screen,
- (B) source slit, diverging lens, prism, diverging lens, screen
- (C) source, converging lens, prism, diverging lens, screen
- (D) source, slit, diverging lens, converging lens, screen
- (E) source, slit, prism, diverging lens, screen

80. The mechanical advantage (MA) of an inclined plane depends on:

- (A) Its length (B) its height (C) the product of its length and height (D) the ratio of its length to its height.

SOLUTION TO POST UME 2005/2006

ENGLISH

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

7. D 8. B 9. A 10. D 11 C 12 B
13. D 14 A 15 A 16 E 17 D 18 D
19. B 20 B
21. Nitrogen, carbon dioxide and the rare gases. E
22. Cracking C 23. A
24. They satisfy the octet for stability of their electric configuration
25. Molar mass of propyne (CH_3CCH) = $(12 + 3 + 12 + 12 + 1)\text{g} = 40\text{g}$
Mole = mass = 2 = 0.05mole molar – mass 40
 $\text{CH}_3\text{CCH} + \text{HBr} \rightarrow \text{CH}_3\text{CHCHBr}$
Required mass of HBr = mole * mass = $0.05 * (1 + 80) = 4.1\text{g} = \text{A}$
26. If the gas is heated the molecules acquire more kinetic energy, thereby increasing the pressure A
27. The particles collide with each other E
28. STV 29. B
30. In electrovalent compounds; valence electrons are transferred not shared
31. =C Conc. H_2SO_4 acid is able to remove elements of H_2 and oxygen in the form of water from the compound of sugar: $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ $12\text{C} (- 11 \text{H}_2\text{O}$ in the presence of H_2SO_4)
32. D 33. D 34. B
35. By Gay-Lussac's law of combining volumes
 $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
2 : 1 : 2
40 : 20 : 40
Residual gas = 10cm^3 of unreacted hydrogen + 40cm^3 of steam formed = $50\text{cm}^3 = \text{A}$
36. Ammonia carbonate decomposes to liberate ammonia, CO_2 and $\text{H}_2\text{O} = \text{E}$
37. $\text{P}_1\text{V}_1 = \text{P}_2\text{V}_2$ thus $720 \times 500 = 760 \times \text{V}_2$ $\text{V}_2 = 427\text{cm}^3$
 $\frac{\text{T}_1}{\text{T}_2} = \frac{\text{P}_2}{\text{P}_1}$ $\frac{303}{273} = \frac{\text{P}_2}{720}$
38. = E Metals ionize by electron loss, while non – metals ionize by electron gain
39. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O} = \text{E}$ 40 B
41. $\frac{25}{12} - \frac{17}{8} \times \frac{6}{5} = 29 - 15 \times \frac{6}{5} = 29 - 9 = 1 = \text{A}$
12 8 5 12 4 6
42. $a(b + c) + \frac{5}{b} - 2$ multiply both sides by b then simplify $ad(b + c) + 5 - 2d = 0 \Rightarrow adb + adc + 5 - 2d$
put the expression with c on the LHS. $adc = 2d - 5 - adb$ thus $c = \frac{2d - 5 - adb}{ad}$
43. Speed $S = \frac{\text{Distance}(D)}{\text{Time}(T)}$ $D = 2S = D$ NB 20min =

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1/3 hrs Time(T) 2

The time on second trip = 2 - 1 = 5hrs 33

Hence $(1 + S) = D$ $D = 5/3$ $(1 + S) = 25 1/3$

$5 + 5S = 6S$ and we find that $S = 5 = C$

44. B the ratio of the squares on corresponding sides

45. 10% of N400 = thus remainder is $400 - 40 = 360$

40% of N360 N144 and the total = N184 = C

46. Mode is most occurring i.e. highest frequency = 7 = D

47. $x^2 - x = x(x - 1)$ $2x^2 + x - 1 = (2x - 1)(x + 1)$ $x^2 - 1 = (x + 1)(x - 1)$ No common factor = D

48. $\log 100 - \log 4 = \log_{10} (100/4) = 0 = C$

$\log_{10} 4 - \log_{10} 2 = \log_{10} (4/2)$

49. Put $f(x - 2) = f(1)$ then $x - 2 - 1$ gives $x = 3$

From $3x^2 + 4x + 1 = 3(3)^2 + 4(3) + 1 = 27 + 12 + 1 = 40$ B

50. P:g = 1/3: 1/2 and q:r = 2/5: 4/7

$R = q \Rightarrow 3p = 2q$ and $q = 3p$

$1/3 : 1/2$

$P = r \Rightarrow 3/2p = 7r$

$2/5 : 4/7 : 2/5 : 4$

$15p = 7r \Rightarrow p = 7$ thus $p:r = 7:15 = B$ 4 4 r 15

51. Mathematically $X_1 = ky^3z^4$ and $X_2 = K(y/2)^3(2z)^4$

$X_2 = k \times y^3 \times 16z^4 = 2ky^3z^4$

$X_2 = 2y^3z^4 = 2$ thus $x_2 : x_1 = 2 : 1 = B$

$X_1 : y^3 : z^4$

52. $Lx^3 + 2kx^2 + 24$ when $x + 2$ is a factor then we can put $x = -2$; $L(-2)^3 + 2k(-2)^2 + 24 = 0$ thus $-8L + 8k + 24 = 0$ divided through by 8 to get $k - L = -3$. When $x - 1$ is a factor then we can put $x = 1$ $L(1)^3 + 2k(2)^2 + 24 = 0$ $L + 2k = -24$ solving the two gives $3k = -27$ and $k = -9$

Also from $k - L = -3$; $-9 - L = -3$ thus $L = -6$

Hence $k = -9$ and $L = -6 = A$

53. D 54. A 55. C 56

57. C

58. Length of arc

59. STV 60. STV 61. E 62 B

63 Mass of deposited substance (M) = $M_2 - M_1 = (5.015 - 5.005)g = 0.01g$

From $M = ZIT$ we say $Z = M = 0.01 = 0.01$

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$$0.00004g/C = A$$

$$IT \ 5 \times 50 \ 250$$

$$64. \ STV \ 65. \ A \ 66. \ D \ 67. \ B$$

68. Since answers are given in W, we assume that the question requires us to find power whose units is W
force (F) = Ma = 50 x 10 = 500N
Work done (W) = Force Distance = 500 x 5 = 2500J

Power is the rate of doing work = $\frac{W}{t} = \frac{2500}{5} = 500 =$

$$69. \ K.E \times 100 = \frac{1}{2}MV^2 \times 100 = \frac{1}{2} \times 20 \times 100$$

$$P.E \ mgh \ 10 \times 100 \ 70. \ STV$$

$$71. \ MC.p(02 - 01) = 22000 \ \text{Thus } Cp = 22000$$

$$1.5(30 - 20) \ Cp =$$

$$1466.67 \ J/Kg \ -10C - 1 = A$$

$$72. \ m = v = 30 = 2 = D \ f \ 15$$

$$73. \ r = 2, \ I = 0.5A, \ R = 5$$

$$E = I(R + r) = 0.5(5 + 2) \ E = 3.5 \ \text{volts} = B$$

$$74. \ \text{Using } 1 = 1 + 1, \ 1 = 1 + 1, \ 1 = 2 + 1, \ 1 = 3 \ \text{fu v } 20$$

$$\frac{1}{2} v \ v20 \ v \ v \ 20 \ v \ \text{hence } v = 60 \text{cm} = C$$

$$75. \ B \ 76. \ D \ 77. \ B \ 78. \ D$$

$$79. \ STV \ 80. \ STV$$