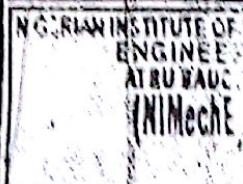


ABUBAKAR TAFAWA BALBUWA UNIVERSITY, BAUCHI
SCHOOL OF MANAGEMENT TECHNOLOGY
GENERAL STUDIES DIRECTORATE

FIRST SEMESTER, 2010/2011 EXAMINATION

GNS 101: USE OF ENGLISH I



Instructions: Attempt all questions.

Time allowed: 2 Hours

SECTION A: GRAMMAR

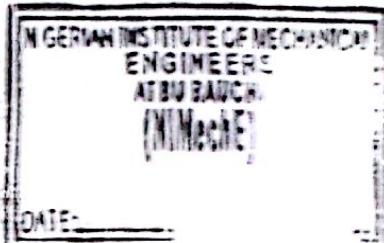
- I Each of the expressions, numbered 1 to 10 below, is either a complete sentence or a mere fragment. Against each number indicate either "S" if it is a sentence and "F" if a fragment.

1. The prime minister's statement in parliament on these matters. F
2. When a substance changes from liquid to gas, it is said to vaporize. S
3. The house that Japhet built. F
4. Some interesting books on astronomy that he has found. F
5. There are unreasonable expectations of an improvement in conditions. F
6. There comes the old woman. S
7. Don't be stupid! S
8. Do be a good boy and sit still. S
9. Alloys which contain iron, cobalt or nickel. F
10. Does anybody know the date? S

- I The sentences below are grammatically wrong. Rewrite them out correctly.

1. Of the three compositions, this is the worse of them. worse
2. Mrs Nwachukwu bought a lot of stationeries for her store.
3. The woman shouted on the girl for the misdeeds.
4. The biology laboratory is stocked with a lot of sophisticated equipment.
5. The organization needs more personnel, therefore you can apply.
6. Ade speaks his mother tongue well, but uses many slangs.
7. Hauwa and Aisha were almost friendless as a result of their bad characters.
8. The sand storm of 1988 in the north eastern Nigeria caused a lot of damages to lives and property.
9. I can hear the smell of gas in this room. sense
10. I will follow you to Kaduna if there is room in your car.

ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
FACULTY OF MANAGEMENT TECHNOLOGY
GENERAL STUDIES DIRECTORATE
FIRST SEMESTER, 2014/2015 SESSION
CONTINUOUS ASSESSMENT TEST



COURSE: GNS 101 (USE OF ENGLISH I)

TIME ALLOWED: 30 MINUTES

INSTRUCTIONS: 1. ANSWER ALL QUESTIONS.

2. PROVIDE ALL YOUR ANSWERS ON THIS QUESTION PAPER AND SUBMIT TO
THE INVIGILATORS.

CANDIDATE'S NAME.....

REGISTRATION NUMBER.....

DEPARTMENT.....

I. Supply the most appropriate words to fill in the missing gaps.

The two basic parts of a sentence are Subject and Predicate. The number of ideas contained in a simple sentence is ...3... and a complex sentence has ...4... ideas. Sentences are classified according to function into Declarative, Interrogative, Imperative or Exclamatory. Sentences are also classified based on structure into Simple, Compound, Complex and Compound-Complex.

II. 'she' is the subject in the sentence: 'She bought her children oranges in the market.'

- 'bought' is Verb.....in the sentence.
- 'her children' is Direct Object.....in the sentence.
- 'oranges' is Object of the preposition.....in the sentence.
- 'in the market' is Prepositional phrase.....in the sentence.

III. Underline the predicate in each of the following sentences.

17. Lend me your book please.

18. The rich also cry.

19. Usman is our group leader.

20. Teaching is a noble profession.

IV. Underline the subject in each of the sentences below.

21. The girl standing under the tree is my sister.

22. Reluctantly, the bride received her sister-in-law.

23. They made Usman their group leader.

24. Usman is our group leader.

V. In each of the following sentences, underline the correct answer from the two options provided in brackets.

25. Each of the mangoes...(is/are)...bad.

26. Mrs. Anazi, the teacher and trader...(look/looks)...charming this evening.

27. My mother together with my sisters...(have/has)...gone to the scene of the accident.

28. A case of instruments...(are/is)...lying outside.

29. Neither the children nor their mother...(like/likes)...the food.

30. Bread and butter...(are/is)...good for teenagers. P

III The words below are spelt wrongly. Write them out correctly.

1. achieve 2. frequently 3. increasingly 4. insufficient
5. interviewed
6. maintaining 7. medecine 8. reaserch 9. referring
10. Successrul

achieve

interviewed

maintaining

Successrul

medecine

Successrul

reaserch

Successrul

referring

Successrul

IV Below is a list of verbs. For each verb, form a noun from it.

1. falsify - false 2. beauty - beauty 3. sight - sight 4. belief - belief 5. codify - code
6. horrify - horror 7. think - thinking 8. seize - seizure 9. relieve - relief 10. choose - choice
11. hope - hope 12. hate - hate 13. practise - practice 14. expect - expectation 15. personify - personification 16. beautify - beautification
17. advise - advice 18. serve - service 19. rise - arise 20. judge - judgment

SECTION B: LABORATORY REPORT WRITING

I Against each numbered gap, supply the appropriate "be" form of the verb and then change the verb stem in the brackets to realize a past passive tense relevant to laboratory report writing.

Two beakers 1 (fill) with water. In each beaker, a glass cylinder 2 (immerse), across the bottom of which a membrane 3 (tie). The membrane allows water to pass through it freely, but it would not allow molecules of dissolved protein to pass through it, since protein molecules are larger than molecules of water. Two protein solutions 4 (then make up). One at a concentration of 5 g dm^{-3} and the other at 10 g dm^{-3} . of the 5 g dm^{-3} solutions 5 (prepare) into one of the glass cylinders. The level of water 6 (adjust) until they 7 (be) equal. The experiment 8 (then leave) for a period of 24 hours.

It 9 (later observe) that the level of the water and protein solution were considerably different from when the experiment 10 (begin). The level of liquid in the cylinders 11 (see) to be higher than the level of water in the beakers. Moreover, when the height of the liquid in each beaker 12 (measure), it 13 (find) that the height of the column of liquid in the cylinder containing the more concentrated solution was twice the height of that containing the other solution.

II The following statements are about elements of laboratory report writing. Match each number I to 5 with the corresponding letter numbering A to H that is appropriate to it.

- A. 1. details of how you tested your hypothesis clarifying how you performed your study in that particular way. - *Method*
B. 2. states your hypothesis and explains how you derived that hypothesis through the objectives, importance and the overall background of the experiment. - *Objectives*
C. 3. considers whether the data you obtained support the hypothesis and explores the implications of your findings as well as potential limitations. - *Conclusion*

ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
SCHOOL OF MANAGEMENT TECHNOLOGY
GENERAL STUDIES DIRECTORATE



FIRST SEMESTER, 2011/2012 EXAMINATION

GNS 101: USE OF ENGLISH I

Instruction: Answer all questions.

Time allowed: 2 Hours

SECTION A: GRAMMAR

I Identify the subject and the predicate in the following sentences.

1. Get out of the room at once.
2. Do you know the way to the newly established factory?
3. Without telling anybody, he disappeared.
4. Simpson, the wonderful footballer, died on a football field.
5. The room to let has been taken by that bachelor.
6. It is paining me a lot.
7. Aisha gave Amina a ruler and a pencil.
8. Either of these power supplies is satisfactory.

The sentences below are grammatically wrong. Rewrite them out correctly.

1. The pipe in the chemistry laboratory burst yesterday.
2. Of the two sisters, Binta is the most brilliant.
3. The African bullfrog, together with other amphibians, live in or near water.
4. Neither the students nor their teacher knows the outcome.
5. Alhaji Aliyu bought a new set of furniture for his new house.
6. Mrs Adeyemi lost all her jewelleries when armed robbers broke into her compound.
7. The department of food technology comprises of five course options.
8. We have just discussed about Shade's unacceptable behaviours.
9. Five thousand Naira can buy little these days.
10. Economics require a lot of calculations.
11. Seventeen years are too long to be away from home.
12. News are very highly valued today.
13. They sells like hot cake.
14. My pair of trousers are torn.

SECTION B: LABORATORY REPORT WRITING

I. Match the following information to the appropriate items below them.

- A. It involved the weight and pulley apparatus and the inclined plane apparatus and, using a range of different loads, measurements of the coefficient of friction were made as required.
- B. The investigation was undertaken to compare the speed and reliability of two possible tests to measure the coefficient of sliding friction between two materials.
- C. In the light of the findings, it can be inferred that accuracy and length of time taken for the two measurements were significantly different.
- D. Comparison of two methods of measuring the coefficient of sliding friction between materials.
- E. It is, therefore, necessary that the inclined plane method be used only where accuracy is less important than speed of execution
- F. It was shown that the measurement using the inclined plane method took an average about half the time but the results were less repeatable

Items: 1. Conclusion, 2. Appendix, 3. Preface, 4. Material/Method, 5. Recommendation
6. Summary, 7. Discussion, 8. Purpose, 9. Bibliography, 10. Main Result, 11. Index

II. Write either TRUE or FALSE for each of the following statements about laboratory report.

- 1. Technical report writing involves the use of verifiable information.
- 2. The language of report is impersonal and subjective.
- 3. Active voice is more appropriate.
- 4. Procedure and methods are synonymous terms.
- 5. Results and discussion of results are similar.
- 6. An abstract consists of a single paragraph.

SECTION C: READING, NOTE TAKING AND NOTE MAKING

Copy and complete the paragraph below by filling in the numbered gaps from the options given in brackets. Underline your chosen options.

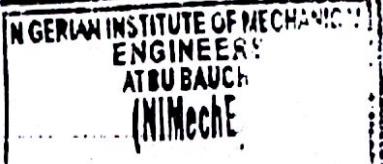
Nearly half the adult population of the USA are smokers, in ...1...(A. addition to B. spite of C. agreement with) the fact that medical research has shown beyond reasonable doubt that smoking is associated with poor health. One very important disease with ...2...(A. whom B. what C. which) smoking is thought to be connected is cancer....3.... (A. However, B. Also C. Indeed), a few doctors think such diseases as bronchitis and cancer have other ...4... (A. results B. effects C. causes), ...5...(A. and B. but C. so) their view is not well supported statistically...6...(A. But, B. Although, C. Yet) all forms of smoking are almost certainly dangerous, cigarettes appear to be the most harmful.

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ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI



FACULTY OF SCIENCE

DEPARTMENT OF PHYSICS

DATE _____

END OF FIRST SEMESTER EXAMINATION, 2015/2016 ACADEMIC SESSION.

PHY.171: BASIC EXPERIMENTAL PHYSICS I

August, 2016

INSTRUCTION: ANSWER ALL QUESTIONS

TIME ALLOWED: 1 HR. 30MINS. Use $g = 9.8m/s^2$

1. In an experiment of a spring performing simple harmonic oscillation, the following readings were obtained for 30 oscillations:

t ₁ (s)	12.2	18.3	21.7	25.0	27.5	30.0
t ₂ (s)	13.4	18.3	21.5	25.0	27.5	30.0
Mean t(s)						
Mass M(g)	100	200	300	400	500	600
T(s)						
T ² (s ²)						

The period of the oscillation is given by $T = 2\pi\sqrt{\frac{M+m}{\lambda}}$

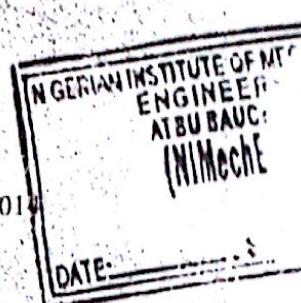
- i. Copy and complete the table
 - ii. Transform the equation to a straight line equation
 - iii. Hence plot a suitable graph from (ii)
 - iv. From the graph, deduce λ
2. A 50-g mass vibrates in SHM at the end of a spring. The amplitude of the motion is 12cm and the period is 1.70s. Find: (a) the frequency, (b) the spring constant and (c) the maximum speed of the mass.
3. The diameter of a metal bar is measured several times and the results are found to be 1.20, 1.25, 1.15, 1.20, 1.10cm.
- i. What is the mean value of the diameter?
 - ii. What is the standard error of the mean?

REG. NO..... PROGRAMME..... VENUE.....

ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS

PHY 171: Basic Experimental Physics I
End of Course Examination,

July, 2011



INSTRUCTIONS:

- (i) Attempt ALL questions. (ii) Recommended Time: 1 hour 30 min.
(iii) Please write your Registration number and Programme on your answer script

The following readings were obtained in an experiment with a compound pendulum:

$h(\text{cm})$	7.0	18.0	25.0	45.0	61.0	84.0
$t(\text{s})$	36.0	35.6	35.1	33.9	33.1	31.6

1. (a) Make a table of T^2 and h where $T = t/10$
(b) Plot a graph of T^2 against h
(c) Determine the intercept on the T^2 axis and the slope of the graph
(d) Write down the linear relationship between T^2 and h
(e) If T and h are theoretically related by $T = 2\pi \sqrt{\frac{(h^2 + k^2)}{gh}}$ where k is a constant.
Transform the equation to linear form.
(f) By comparing the equations in (d) and (e) above, deduce the value of g .
(g) List two precautions that would be taken if the experiment is to be performed in a laboratory
2. If a length is given as 5.20 cm, it means that the scale used reads to the nearest
3. Supposing $T_1 = 45.0 \pm 0.6^\circ\text{C}$ and $T_2 = 75.5 \pm 0.3^\circ\text{C}$, if the quoted errors are maximum errors. The value of $T = T_1 + T_2$ is
4. What is the shortest length of a closed tube which resonates with a tuning fork of frequency 320 Hz. Take the speed of sound in air as 336 m/s.
5. If the quoted errors in question 3 above are standard errors, compute $T = T_2 - T_1$

PHY 171 EXAM

$$T^2 = 4\pi^2 \left(\frac{h^2 + k^2}{gh} \right)$$

$$T^2 = 4\pi^2 \frac{h^2}{gh}$$

$$T^2 = 4\pi^2 \frac{h}{g}$$

1

ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
 School of Science
 Physics Programme

PHY 171: Basic Experimental Physics I

End of Course Examination

INSTRUCTIONS:

(i) Attempt ALL questions

(ii) Recommended Time: 1hr



The metre rule was used as a cantilever to perform an oscillation experiment and the following results were obtained:

$t(s)$	4.90	6.63	8.25	8.93	9.82	10.85	11.83
$L(cm)$	50.0	60.0	70.0	75.0	80.0	85.0	90.0

Where t = average time for 20 oscillations, L = length of the oscillating portion of the cantilever.

If the relation between the period, T , and L is

$$T^2 = (A/B)L^3$$

1. (a) Plot a suitable graph to calculate A/B .
 (b) State the unit of A/B .
2. To determine the specific heat capacity of a liquid by electrical heating the relation between the time of heating t for every 2 degree rise in temperature θ is given by the equation

$$IVt = (mc + m_c c_k)(\theta - \theta_i)$$

where c is the specific heat capacity of kerosene and c_k is the specific heat capacity of the calorimeter, transform the equation to the form $y = mx + c$; hence write down the expressions representing c and m .

3. Obviously there will be heat losses from the calorimeter in experiment of question 2 (above). What effect do you think the size of the calorimeter will have on the rate of cooling? Is the rate faster when we use a large one or a small one? Why?
4. When measuring the temperature of boiling water, it is always not recommended to hold the thermometer touching the bottom of the container, why?

V 0

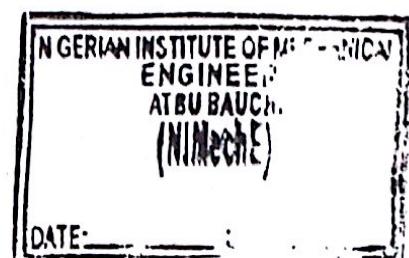
ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
SCHOOL OF MANAGEMENT TECHNOLOGY
GENERAL STUDIES DIRECTORATE
FIRST SEMESTER 2012/2013 EXAMINATION

COURSE- GNS 101: USE OF ENGLISH I (2 Units) TIME ALLOWED: 2 HOURS
INSTRUCTION: Answer all questions from section A to C.

SECTION A: GRAMMAR AND USAGE

I. Write the predicates in the following sentences.

1. Farming is a good occupation.
2. Her writing is not legible.
3. The thief disappeared when the lady shouted for help.
4. Map reading is an interesting aspect of Geography.
5. It is important to know how many students have actually registered for the course GNS 101.
6. Won't your parents mind?
7. Slowly and steadily, the moon disappeared.
8. Living in the busy part of the town has its disadvantages.
9. The specially prepared food was done by the chef.
10. They are ill-mannered.



II. The sentences below are grammatically incorrect. Copy them verbatim in your answer booklet and simply underline what makes each one wrong.

1. One of these mangoes have gone bad.
2. Could you borrow me your dictionary?
3. We have being waiting here since morning.
4. The new student is seeking for permission to travel again.
5. We are discussing about the new topic.
6. The advantages of a life of solitude outweighs the disadvantages.
7. Neither the students nor their teacher were at the scene of the accident.
8. Of the three girls I like Aisha better.
9. The party executives resigned when they were found guilty of mismanagement of funds.
10. The king died without issues and was succeeded by his brother.
11. The boy in blue shirt does not hear.
12. Off the light so that everyone can sleep.
13. Dr. Okeke, the lecturer and businessman, look serious.
14. Bribery and corruption go together.
15. My father, together with my brothers, have gone to the scene of the accident.
16. A case of instruments were lying outside.
17. One of the students do not like to take the test.
18. Bread and butter taste good.
19. Mrs. Ajani has plenty of furnitures in her house.
20. The bomb did much damages to lives and properties.

washed

cut

SECTION B: LABORATORY REPORT WRITING

I. Change each of the following sentences to the passive voice, leaving out the agent.

- Something frightened the little boy.
- Someone took the letters.
- No one can understand him.
- My sister was washing her clothes.
- She will explain the problem again.

II. Copy and complete the table of the irregular verbs below

S/No.	Root/Stem	Past tense	Past Participle
1.	Set	Set	Set
2.	Sink	Sank	Sunk
3.	Slide	Slide	Slid
4.	Shake	Shake	Shaken
5.	Sting	Sting	Stung
6.	Cut	Cut	Cut
7.	Fling	Fling	Flung
8.			Spun
9.	Split	Split	
10.			Spread

III. Write whether each of the following statements is true or false.

- The section that presents variables, theory and background associated with the study is called 'introduction'.
- The experimental results presented in steps is known as the 'procedure'.
- The tense used in the procedure section of a laboratory investigation is the past simple form.
- The 'conclusion' section summarises the results in tables or figures.
- The section of a laboratory report that summarises briefly the background, purposes, method, and main result is called the 'objective'.

SECTION C: READING

Fill-in the missing gaps with appropriate expressions to complete the above text regarding writing notes.

The process of writing notes during lectures, seminars, symposia, etc is known as...1... while ...2... refers to the notes students develop during reading of written texts. In addition to oral discourse and written documents, another source of note is...3.... Summary, outlining and graphic are some of the...4... of forming notes. And to record main ideas, to concentrate while reading/listening, memory, to increase knowledge and ensure active study are the ...5...of writing note.

SECTION A: ANSWER ATLEAST ONE QUESTION FROM THIS SECTION

Q1 a) Show that

$$\text{i.) } \frac{\tan x + \cos x}{\sin x} = \sec x + \cot x \quad \text{ii.) } (\sin x + \cos x)(\cot x + \tan x) = \sec x + \csc x$$

b) Verify the following relations

$$\text{i.) } \frac{\cos 2A + \cos 5A + \cos 8A}{\sin 2A \sin 5A \sin 8A} = \cot A \quad \text{ii.) } \tan 3\theta = \frac{3 \tan \theta - \tan^3 \theta}{1 - 3 \tan^2 \theta}$$

Q2 a) Three villages P , Q and R are such that the distance between P and Q is 50km and the distance between P and R is 90km , if the bearing of Q from P is 075° and the bearing of R from P is 310° . Find the solution of the triangle PQR .

b) In any triangle ABC , show that

$$\text{i.) } \sin\left(\frac{A+B}{2}\right) = \cos\left(\frac{C}{2}\right) \quad \text{ii.) } \sin A + \sin B - \sin C = 4 \sin\left(\frac{A}{2}\right) \sin\left(\frac{B}{2}\right) \cos\left(\frac{C}{2}\right)$$

SECTION B: ANSWER ATLEAST ONE QUESTION FROM THIS SECTION

Enumerate any three guidelines in the process of partial fraction decomposition and decompose the following into partial fraction

$$\text{i.) } \frac{2x}{(x+2)(x+3)^3} \quad \text{ii.) } \frac{x^3 + x^2 + 2x}{(x^2 + 2x + 2)(x^2 + 2x + 2)}$$

Outline the guidelines for sketching the graph of a rational number and hence sketch the graph of the following functions

$$\text{i.) } f(x) = \frac{x^2 - x}{(x^2 - 16)} \quad \text{ii.) } f(x) = \frac{x^2}{x^2 - x - 2}$$

SECTION C: ANSWER ATLEAST ONE QUESTION FROM THIS SECTION

Find the modulus and argument of each of the following complex numbers:

$$\text{i.) } \frac{2-i}{3-4i} \quad \text{ii.) } \left(\frac{1}{1-i}\right)^2$$

b) Use the DeMoivre's theorem to find the forth root of the complex number:

$$Z = 8(-1 + i\sqrt{3}) \text{ in the form of } a + bi \text{ where } a, b \in \mathbb{R}$$

Q6 a) Solve for x using the following equations:

$$\text{i.) } 2^{2x+2} + 8 = 33(2^x) \quad \text{ii.) } \log_2\left(\frac{1}{16}\right)^{2x+3} = \log_2 8\left(\frac{5x+1}{3}\right)$$

$$\text{b) Simplify: } \log_2 \frac{5}{3} + \log_2 \frac{6}{7} - \log_2 \frac{5}{28}$$

Q7 a) Find the real and the imaginary part of the root of $z^2 - z + 1 = 0$. Verify that these roots are also the cube root of -1 .b) Suppose that $\log_{27} M = \frac{t}{2}$ and $\log_3 3M = l$ where $l - t = 4$. Show that $M = (27)^3$



ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
DEPARTMENT OF MATHEMATICAL SCIENCES
FIRST SEMESTER 2015/2016 SESSION EXAMINATIONS



MTH 111: CALCULUS I

(3 UNITS)

INSTRUCTIONS: ANSWER ANY FIVE (5) QUESTIONS TIME: 3 HRS DATE: 15th Aug. 2016

- Q1) a) if $\sin \theta = -0.3714$ and $\cos \theta$ is negative, in which quadrant does θ lie? Hence, find the value of θ .
 b) Find in their simplest form the values of: $\frac{\sin 3\theta + \tan \theta}{1 + \cos 2\theta}$,
 if $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60° . What can you say about the expression if $\theta = 90^\circ$?

- Q2) a) Simplify the following:

$$i) \frac{1-\cos^2 \theta}{\sin^2 \theta} \quad ii) (1 + \tan^2 \theta) \cos^2 \theta \quad iii) \frac{\sec \theta}{\cos \theta} - \frac{\tan \theta}{\cot \theta} \quad iv) \frac{1}{1-\sin \theta} + \frac{1}{1+\sin \theta}$$

- b) Prove that:

$$i) \frac{1-\cos 2\theta}{1+\cos 2\theta} = \tan^2 \theta \quad ii) (\sin \theta + \cos \theta)^2 = 1 + \sin 2\theta$$

- Q3) If $\cos A = \frac{4}{5}$ and $\cos B = \frac{12}{13}$ (A and B are both acute), find the values of:

$$i) \sin(A+B) \quad ii) \cos(A-B) \quad iii) \tan(A+B) \quad iv) \tan(A-B) \quad v) \cos(A+B)$$

- Q4) a) Simplify the following expression

$$i) \log_{10} \sqrt{35} + \log_{10} \sqrt{2} + \log_{10} \sqrt{7} \quad ii) \frac{\frac{2}{3} \times 27^{-\frac{1}{3}}}{64^{\frac{1}{3}}}$$

- b) Solve the following equations:

$$i) 2^{2x} + 4(2^x) - 32 = 0, \quad ii) \log_{10}(2x+1) - \log_{10}(3x-2) = 1$$

- Q5) a) Divide the polynomial $P(x) = x^5 + 4x^4 - 3x + 5$ by $Q(x) = x^3 - 2x + 1$ using the process of long division.

$$b) \text{ Decompose } \frac{x}{(x+1)^2(x+2)} \text{ into partial fraction}$$

- Q6) a) Find the values of x and y in each of the following:

$$i. (x+y) + (x-y)i = 14.8 + (6.2)i \quad ii. (2x+4y)i = (2x-4) + 3yi \\ iii. (2x+y) + (3x-4y)i = (x-2) + (4y-5)i$$

- b) Represent the following complex number on an Argand diagram and find their modulus and arguments.

$$i) z_1 = \frac{2}{1-i} \quad ii) z_2 = \frac{i-2}{4i} \quad |z_1| = \sqrt{5}, \quad \arg z_1 = 45^\circ \quad |z_2| = \sqrt{17}, \quad \arg z_2 = 135^\circ$$

- Q7) a) Find the four fourth of the following complex number

$$i) z = \frac{2}{1-i} \quad ii) z = -1 - i\sqrt{3}$$

$$b) \text{ Given that } z_1 = r_1[\cos \theta_1 + i \sin \theta_1], \quad z_2 = r_2[\cos \theta_2 + i \sin \theta_2]$$

Show that $z_1 z_2 = r_1 r_2 [\cos(\theta_1 + \theta_2) + i \sin(\theta_1 + \theta_2)]$. Hence verify that

$$\frac{\cos 3\theta + i \sin \theta}{\cos \theta + i \sin \theta} = \cos 2\theta + i \sin 2\theta$$





ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
DEPARTMENT OF MATHEMATICAL SCIENCES
FIRST SEMESTER 2014/2015 SESSION EXAMINATIONS
MTH111: INTRODUCTORY ALGEBRA I (3 UNITS)



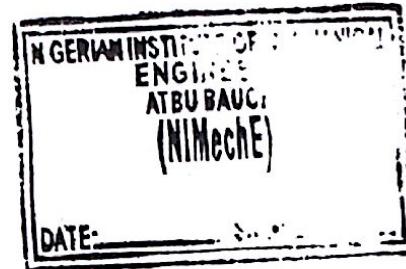
INSTRUCTION: ANSWER ANY FOUR (4) QUESTIONS

TIME: 3 HOURS

DATE: AUG, 04 2015.

SECTION A:

- Q1 a) Given that $\tan A = \frac{4}{3}$ ($180^\circ < A < 270^\circ$) and that $\cos B = -\frac{5}{13}$ ($90^\circ < B < 180^\circ$), find without using tables the values of:
 i.) $\sin(A - B)$ ii.) $\cos(A - B)$ iii.) $\tan(A + B)$
- b) If $\tan(A - B) = \frac{1}{5}$ and $\tan A = 2$ find $\tan B$.
- Q2 i) Prove that:
- $$\frac{1-\cos 2\theta}{1+\cos 2\theta} = \tan^2 \theta$$
- ii) $\cos^4 \theta - \sin^4 \theta = \cos 2\theta$
- iii) $2 \sin\left(\frac{\pi}{4} + \theta\right) \cdot \sin\left(\frac{\pi}{4} - \theta\right) = \cos 2\theta$



SECTION B:

- Q3 a) The remainder when $4x^3 + ax^2 + bx + 8$ is divided by $2x^2 + x - 1$ is $8x + 5$. Find the values of a and b .
- b) Decompose the following into partial fraction
- i) $\frac{x^3 + x^2 + 5}{x^2 + 2x - 3}$ ii) $\frac{2}{(x+3)^3(x+z)}$
- Q4 a) Given that $p = \log_a bc$, $q = \log_b ca$ and $r = \log_c ab$
 Show that $p \cdot q \cdot r = p + q + r + 2$
- b) Given that $x = \log_a n$, $y = \log_c n$ $n > 1$
 Show that

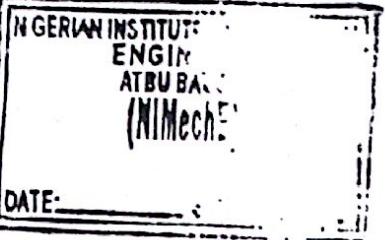
$$\frac{x+y}{x-y} = \frac{\log_b c + \log_b a}{\log_b c + \log_b a}$$

SECTION C:

- Q5 a) Given that $z = x + iy$ and \bar{z} is the conjugate of z , find the values of x and y if
 $\frac{2}{z} - \frac{1}{\bar{z}} = 1 - i$
- b) Express the following complex numbers in the form of $x + iy$ and find the modulus and amplitude of each of the following
- i.) $\left(\frac{2}{i-1}\right)^2$ ii.) $\left(\frac{1+i}{1-i}\right)^2$
- Q6 a) Given that $z_1 = x_1 + iy_1$ and $z_2 = x_2 + iy_2$ verify that:

$$z_1 z_2 = r_1 r_2 [\cos(\theta_1 + \theta_2) + i \sin(\theta_1 + \theta_2)],$$
- and hence verify that:
$$\frac{\cos 3\theta + i \sin 3\theta}{\cos 5\theta + i \sin 5\theta} = \cos 8\theta + i \sin 8\theta$$
- b) Find the six sixroot of the following complex numbers:
- i.) $\left(\frac{1-i}{1+i}\right)^2$ ii.) $\left(\frac{1+i}{1-i}\right)^4$

ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI.
SCHOOL OF MANAGEMENT TECHNOLOGY
GENERAL STUDIES DIRECTORATE



FIRST SEMESTER EXAMINATION 2011 / 2012 SESSION
GNS 201: Information Science (2 Units) Time Allowed: 2 hours

INSTRUCTIONS: Answer all questions from section A - D. All answers must be written in the answer booklet. Write your Programme and School on your answer booklet.

SECTION A: READER SERVICES DIVISION

1. How many borrowers' tickets are issued to undergraduate students? What are the durations right?
2. What are the requirements from a student to be registered as a Library user?
3. A publication that comes out at regular intervals and intend to continue indefinitely in several volumes are referred to as.....
4. Name two types of General Encyclopedia.
5. Mention four items in a card catalogue.
6. Mention three serial materials.
7. Mention three types of Directories.

SECTION B: ORGANISATION OF LIBRARY MATERIALS

8. Mention four conventional elements that may be used to describe a book
 9. The process whereby knowledge is arranged into generally accepted groups is called.....
 10. The entry points to the collections of A, T.B.U, Library are.....and.....
 11. Uses alphabets and numerals to identify a body of knowledge.
 12. The following alphabets represents what kind of body of knowledge (i). QD (ii) HD (iii), TK (iv) Z ?
 13. A 'dumb' terminal relies on.....for data information processing storage.
 14. NIC meanswhile OPAC means.....
- spine dust jacket book cover
\$ paper label

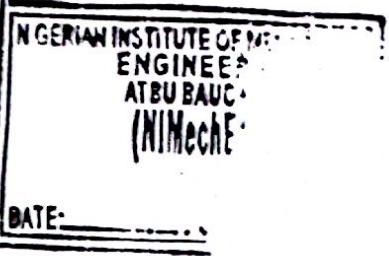
SECTION C: COLLECTION DEVELOPMENT

15. Collection development can be define as.....
16. List two objectives of collection development in Nigerian Libraries
17. Mention three sources of funds for developing Library collections
18. Name three problems of collection development in Nigerian Libraries
19. Three Methods of acquiring materials are ...
20. Which of the following are printed materials (i). textbook (ii). C.D. room. (iii). Newspapers (iv). Maps (v). Computer (vi). Magazines.
21. Which of the following are non-printed materials (i). Newspapers (ii). Radio (iii) journals (iv). Microform (v). Films (vi). cassettes

SECTION D: LIBRARY, INFORMATION AND SOCIETY

22. Name two types of Libraries
23. Name three categories of Users in academic Libraries
24. Information can be used by the recipient to.....
25. What do you understand by the term Library?
26. List two characteristics of information.
27. List two functions of National Library.

ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
FACULTY OF MANAGEMENT TECHNOLOGY
GENERAL STUDIES DIRECTORATE



FIRST SEMESTER EXAMINATION 2013/2014 SESSION

GNS 201: Information Science (2 UNITS) Time allowed: 2 Hours

INSTRUCTION: Attempt all Questions. All answers must be written in the answer booklet.

SECTION A:

1. Library can be defined as.....
2. List five (5) types of Library.
3. Mention (5) types of non-printed materials that can be found in academic library.
4. List five (5) types of printed materials that are available in Libraries:
5. The public library is financed by _____
6. Mobile library is a service provided by _____
7. Mention five (5) users of an academic library:

SECTION B:

1. List five services offered in the Circulation Section.
2. Give five (5) reasons for keeping materials on reserve.
3. List five (5) types of services offered in the Reference section.
4. List any five types of materials available in the Reference section.
5. List five items that come under subsidiaries of a book.
6. Give any five importance of a Catalogue.
7. A book can be defined as _____ and it is divided into _____ main parts.

SECTION C:

1. List five Bibliographic items on a catalogue Card.
2. Arrange the following as they would appear on a shelf:
i) QA76.J61 ii) Q13 .A1 iii) QA 165. P31 iv) QB 40.T21 v) Q10.T11
3. State the term used to describe the process of producing the principal list of library collections.
4. Outline five (5) different types of library classification scheme.
5. What is the name given to a device that enables a computer to participate in a network?
6. A student needs to do an assignment which has an explicit topic. But the student is handicapped: no author or title of a book that deals with that topic is known to the student. Which access point in ATBU library should such student begin the search?
7. Name the library standard tool that uses alphabet and numerical to organize knowledge into various groups.

SECTION D:

1. List five (5) objectives of collection development.
2. State five (5) principles of collection development.
3. Itemise any five (5) Bibliographic information of a book.
4. State any five (5) sources of acquiring library materials.
5. Identify any five (5) challenges of collection development.
6. Suggest five (5) solutions to the stated problems in (5).
7. Legal deposit is an act No..... of..... Section No of published books to be deposited by private/commercial is by state government is

Borrowing
Borrow

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GENERAL STUDIES DIRECTORATE

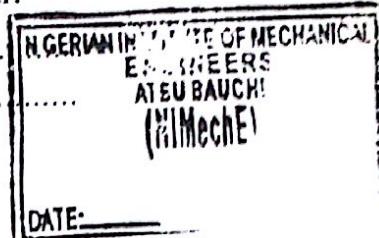
FIRST SEMESTER, 2013/2014 CONTINUOUS ASSESSMENT TEST

GNS 201: Information Science (2 units) TIME ALLOWED: 45 minutes

INSTRUCTIONS: Answer all questions. Provide your answers on the question paper.

REG. NO..... PROGRAMME:.....

NAME.....



SECTION A: LIBRARY, INFORMATION AND SOCIETY.

1. Library is a place where both.....andmaterials can be obtained.
2. Information can be referred to asor
3. One of the roles of information is
4. One of the roles of library is to.....
5. Mention two types of library.....
6. The objective of the University library is in the area ofand
7. Another name for National library is.....
8. Users of an academic library are.....,..... and
9. The users of school library are.....
10. The Polytechnic library could also be regarded as
11. The services of Public library are meant for.....
12. One of the characteristics of special library is
13. One of the functions of National library is.....
14. The head of University library is.....
15. The stake-holders - users of academic libraries are and

SECTION B: COLLECTION DEVELOPMENT DIVISION.

1. Collection development is a systematic way of building up.....
2. Name two sources of acquiring library materials.
3. Two main processes in collection development areand
4. Another name for exchange of library materials is
5. Two main methods by which library receive Gifts and Donations areand
6. Physical processing of newly acquired library collections include.....and
7. Stamping of library collection implies.....
8. Borrowing of books from another library on behalf of users is called.....
9. Legal deposit is an act of giving specific numbers of books to the national library. True/false
10. Library materials are purchased from.....and
11. Foreign currency is used to purchase foreign materials while local currency is used to purchase Nigerian books. True/false
12. The objective of collection development is to provide relevant and up-to-date materials to support teaching, learning and research. True/false.
13. Government funding is the only source for collection development in the library. True or False.
14. Two of the challenges of collection development areand
15. The full meaning of N.F. is.....



ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
DEPARTMENT OF MATHEMATICAL SCIENCES
FIRST SEMESTER 2013/2014 SESSION EXAMINATIONS
MTH112: CALCULUS I (3 UNITS)



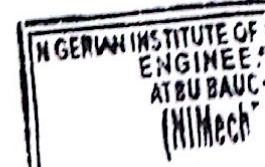
INSTRUCTION: ANSWER ANY FIVE (5) QUESTIONS

TIME: 3 HOURS

DATE: JULY, 25 2014.

SECTION A: ANSWER ATLEAST ONE QUESTION FROM THIS SECTION

- Q1. a) i.) Define continuity of a function at a point.
ii.) State any five (5) properties of real numbers.
b) Show that $\sqrt{2}$ is irrational.
- Q2. a) Use diagram only to describe the following types of mapping:
i.) Constant ii.) Identity iii.) One-One iv.) Onto
b) If $f: x \rightarrow 1 + 2x$ and $g: x \rightarrow \frac{1}{1+x}$, $x \in R$ and $x \neq -1$, find
i.) $(f^{-1} \circ g^{-1})(\frac{2}{3})$ ii.) $(g^{-1} \circ f^{-1})(\frac{2}{3})$
- Q3. Find limit values of the following functions below:
i.) $\lim_{x \rightarrow \infty} \frac{3x^2 - 5x\sqrt{x} + 2}{5x^2 + 7x + 6}$ ii.) $\lim_{x \rightarrow 0} \frac{1 - \cos 4x}{x}$ iii.) $\lim_{x \rightarrow 0} \frac{\sin(\tan(\sin x))}{x}$



SECTION B: ANSWER ATLEAST ONE QUESTION FROM THIS SECTION

- Q4. a) Differentiate the following functions using the method of first principle
i.) $\cos x$ ii.) $\sin x$
b) Find y' and y'' for the curve $x^3 = y^2 - x^2$ examine what happens to y' at $(-1, 0)$ and at the point $(0, 0)$.
- Q5 a) Find the tangent line to the curve defined by $x^2 + y^2 = 2 + x^2y$ at the point $(1, 3)$
b) Differentiate the following implicit functions:
 $\sin y + x^2 + 4y = \cos x$
 $3xy^2 + \cos y^2 = 2x^3 + 5$

SECTION C: ANSWER ATLEAST ONE QUESTION FROM THIS SECTION

- Q6. a) Evaluate each indefinite integral directly, by substitution or by parts:
i.) $\int \cos^{-4} x \sin x \, dx$ ii.) $\int x^2 \sqrt{x+3} \, dx$
b) i.) $\int x \sec^2 x \, dx$ ii.) $\int \cos \sqrt{t} \, dt$
- Q7. a) Use trigonometric integration to evaluate:
i.) $\int \tan^2 x \sec x \, dx$ ii.) $\cos^2 x \tan^5 x \, dx$
b) Evaluate the integrals using trigonometric substitution:
$$\int \frac{1}{x^2 \sqrt{(16-x^2)}} \, dx$$

ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI

DEPARTMENT OF MATHEMATICAL SCIENCES

MTH 111 TEST (ELEMENTARY ALGEBRA) PART B 2015/2016 SESSION

INSTRUCTIONS:

ANSWER ALL QUESTIONS

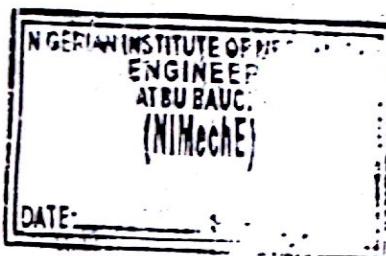
TIME 1H

Q1) if $\sin A = \frac{4}{5}$ and $\cos B = \frac{-12}{13}$ find the value of $\tan(A - B)$ when

- i) A and B are both obtuse ii) A is acute and $180^\circ < B < 270^\circ$

Q2) Without using tables, find the values of the following, in simplified surd form when necessary.

i) $\frac{\tan 330^\circ + \tan 210^\circ}{1 - \tan 300^\circ \tan 210^\circ}$ ii) $\cos^2 300^\circ - \sin^2 300^\circ$

Q3) Simplify: i) $\frac{1 - \cos^2 \theta}{\sin^2 \theta}$ ii) $\frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta}$ 

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MATHEMATICAL SCIENCES PROGRAMME
FIRST SEMESTER 2012/2013 SESSION
MTH111: ELEMENTARY ALGEBRA 1 TEST

INSTRUCTION: ANSWER ALL QUESTIONS

TIME: 45 MIN

Q1. Find the modulus and argument of the following complex numbers:

(i) $\frac{2}{(1+i)^2}$ (ii) $\frac{1}{z}$ where $Z = \frac{5}{2} - \frac{5}{2}i$

Q2. Evaluate the complex quantity $\left(\frac{-\sqrt{3}}{z} - \frac{1}{z}i\right)^{20}$ Q3. (i) Solve $\frac{1}{2} \log_5(x-2) = 3 \log_5 2 - \frac{3}{2} \log_5(x-2)$ (ii) Eliminate the negative exponents and simplify, $\frac{ex^2 v^{-3}}{4x^{-1} v^2}$

DEPARTMENT OF MATHEMATICAL SCIENCES
MTH111 Continuous assessment test I

Time allowed: 45 Mins

Instructions: Answer all questions

Q1a) Find the modulus and argument of each of the following complex numbers;

(i) $\frac{1+i}{1-i}$ (ii) $\left(-\frac{1}{2} - \frac{\sqrt{3}}{2}\right)^2$

b) Solve for x the following equation;

(i) $\log_x 9 + \log_x 3 = 2.5$ (ii) $5^{x-1} = 0.2$

Q2a) For what value of m is $(x+8)$ a factor of $P(x) = x^3 + 3x^2 - x + m$.

b) Sketch the graph of f if i) $f(x) = \frac{5x}{4-x^2}$ ii) $f(x) = \frac{x^2}{x^2 - x - 2}$

$$\begin{aligned}
 x &\neq 0 & 1' \\
 x &= -8 & \rightarrow x = 8 \\
 7x^3 + 3x^2 - x + h_1 &= 0 & + \\
 (-5)^3 + 3(-5)^2 - (-5) &= h_1 & \\
 -512 + 192 + 5 &= h_1 & \\
 -512 + 192 + 5 &= h_1 & \\
 5m &= 512 - 192 & \\
 5m &= 320 & \\
 \frac{5m}{5} &= \frac{320}{5} & \\
 m &= 64
 \end{aligned}$$



ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
MATHEMATICAL SCIENCES PROGRAMME
FIRST SEMESTER EXAMINATIONS 2012/2013 SESSION
MTH111: ELEMENTARY ALGEBRA I (3 UNITS)



INSTRUCTION: ATTEMPT ANY FOUR (4) QUESTIONS TIME: 2½ HOURS DATE: APRIL 16, 2013

SECTION I: Answer at least one question from this section

Q1. (a) Solve the following equations

i.) $8\cos^2x + 6\sin x - 9 = 0 \quad 0 \leq x \leq 2\pi$

ii) $3\sin^2x + 2\cos x = 1 \quad 0 \leq x \leq 2\pi$

(b) Express the following in the form stated

i.) $2\sin\theta - 3\cos\theta$ in the form $R\cos(\theta - \alpha)$ ii) $\cos\theta + 2\sin\theta$ in the form $R\sin(\theta + \alpha)$

Q2. (a) Three villages P, Q, and R are such that the distance between P and Q is 50km and the distance between P and R is 90km. If the bearing of Q from P is 075° and the bearing of R from P is 310° . What is the bearing of Q from R?

(b) In any triangle ABC, show that $\tan \frac{b-c}{2} = \frac{b-c}{b+c} \cot A/2$

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ENGINEERS
ABUBAUCHI
(NIMechE)

DATE: _____

SECTION II: Answer at least one question from this section

Q3. (a) Given that $x = r\sin\theta\cos\alpha$, $y = r\sin\theta\sin\alpha$ and $z = r\cos\theta$, show that $x^2 + y^2 + z^2 = r^2$

(b) Given that $a\cos^2\theta + b\sin^2\theta = c$, show that $\tan^2\theta = \frac{c-a}{b-c}$.

Q4. Simplify the following expressions

i.) $\left(\frac{3x^2y^3}{4x^3y^2}\right) \left(\frac{2xy^4}{6x^5}\right)$

ii.) $\left(\frac{y^{-1}}{2x^{-1}}\right) \left(\frac{2x}{y}\right)^{-1}$

iii.) $\left(\frac{(xy)^{-1}}{x^{-1}y^{-1}}\right)$

SECTION III: Answer at least one question from this section

Q5. Solve i.) $\log_2(3x^2 + 2x + 1) = 1$ ii.) $\log_3(x - 7) = 2 - \log_3(x + 1)$ iii.) $4e^{2x} + 1 = 5e^x$

Q6. (a) Find the moduli and arguments of the following complex numbers:

i.) $Z_1 = \frac{2+i}{3i+1}$

ii.) $Z_2 = \frac{i+3}{2-i}$

iii.) $Z_1 + Z_2$

(b) Find the two real numbers x and y such that: $(1 - i)2x + 4(1 + 2i)y = 6$



ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
MATHEMATICAL SCIENCES PROGRAMME
FIRST SEMESTER 2011/2012 SESSION
MTH111: ELEMENTARY ALGEBRA 1 TEST



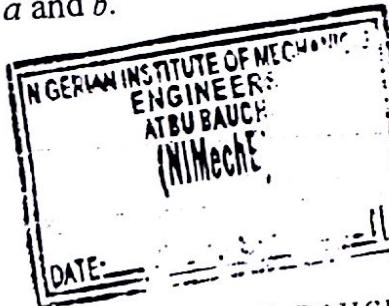
INSTRUCTION: ANSWER ALL QUESTIONS

TIME: 1 HOUR

Q1. Verify that: $\sin^{-1}\left(\frac{1}{\sqrt{5}}\right) + \sin^{-1}\left(\frac{1}{\sqrt{10}}\right) = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$.

Q2. If $\cos(\alpha + \beta) = k[\cos(\alpha - \beta)]$ show that $k = \frac{\cot \alpha \cot \beta - 1}{\cot \alpha \cot \beta + 1}$.

- Q3. a) Suppose $\log 2 = a$, show that $\log_8 5 = \frac{1-a}{3a}$. Also find the value of $\log_5 24$ in term of a and b if $\log 3 = b$.
 b) The remainder when $2x^3 + ax^2 + bx - 3$ is divided by $x + 3$ is 0, but 1, when divided by $x + 2$. Find the values of a and b .



ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
MATHEMATICAL SCIENCES PROGRAMME
FIRST SEMESTER 2011/2012 SESSION
MTH112: ELEMENTARY CALCULUS TEST



INSTRUCTION: ANSWER ALL QUESTIONS

TIME: 1 HOUR

Q1. Find the domain of the following functions:

a) $y = \sqrt{4x - x^2}$

b) $y = \sqrt{24 + 10x - x^2}$

Q2. a) Differentiate the following expression using first principle.

i) \sqrt{x} ii) $\cos 4x$

b) Show that the gradient of the ellipse $b^2x^2 + a^2y^2 = a^2b^2$ at point $(a \cos \theta, b \sin \theta)$ is $(-b/a) \cot \theta$.

Q3. a) Briefly explain the term integration in Mathematics.

b) Evaluate the following:

i) $\int 9^{5x} dx$

ii) $\int \frac{\sin^2(3x)}{1+\cos(3x)}$

$$\begin{aligned} & \sin^2 3x \\ & \sin^2 3x + \cos^2 3x = 1 \end{aligned}$$

$$\begin{aligned} & \cos^2 3x - 1 \\ & (\cos 3x - 1)(\cos 3x + 1) \\ & \cos^2 3x - 2 \cos 3x \end{aligned}$$


ABUBARAK TAFAWA BALEWA UNIVERSITY, BAUCHI
 MATHEMATICAL SCIENCES PROGRAMME
 FIRST SEMESTER EXAMINATIONS 2011/2012 SESSION
 MTH111: ELEMENTARY ALGEBRA I (3 UNITS)

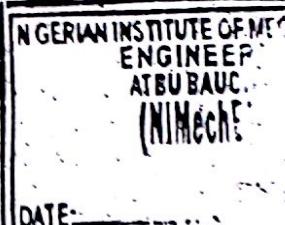


INSTRUCTION: ANSWER ANY FIVE (5) QUESTIONS

TIME: 3 HOURS

DATE: APRIL 19, 2012

- Q1.** a) The expression $ax^3 + bx^2 + cx + d$ is divisible by $x - 1$. It has remainders -4 and 18 when divided by $(x - 2)$ and $(x - 4)$ respectively. Find the values of a, b, c , and d .
 b) Given that $x = -1$ is the double root of the polynomial $x^4 + 2x^3 + 2x^2 + 2x + 1$; factorize the polynomial completely and decompose $\frac{2x^3+2x^2+2x}{x^4+2x^3+2x^2+2x+1}$ into partial fraction.
- Q2.** a) If $p = \log_a bc$, $q = \log_b ca$, $r = \log_c ab$, prove that $p, q, r = p + q + r + 2$
 b) Solve the following equations:
 i) $2^x + 2^{x-1} = 48$ ii) $6[3^x + 3^{-x}] = 20$
- Q3.** a) Verify the following identity:
 $\sin 2A \cos 4A + \sin 3A \cos 9A = \frac{1}{2}[\sin 12A - \sin 2A]$.
 b) Given that $\cos(A+B) = P[\cos(A-B)]$, show that $P = \frac{\cot A \cot B - 1}{\cot A \cot B + 1}$.
- Q4.** a) Suppose $\log_{27} m = \frac{t}{2}$ and $\log_3 3m = l$, where $l - t = 4$, show that $m = (27)^3$.
 b) Simplify the following expressions:
 i) $27^{m+2} \times 4^m \div 6^{2m}$. ii) $\frac{1}{3^{5n}} \times 9^{n-1} \times 27^{n+1}$.
- Q5.** a) Verify that $\text{Arc sin}\left(\frac{1}{\sqrt{5}}\right) + \text{Arc sin}\left(\frac{1}{\sqrt{10}}\right) = \text{Arc sin}\left(\frac{1}{\sqrt{2}}\right)$.
 b) Find the solution of $8\cos^2 x + 6\sin x - 9 = 0$ which lies between 0 and 2π .
- Q6.** a) Show that $\tan^2 x = \frac{c-a}{b-c}$ given that $a \cos^2 x + b \sin^2 x = c$.
 b) Given that $\csc(90^\circ - \theta) + y \cos \theta \cot(90^\circ + \theta) = \sin(90^\circ + \theta)$, show that $y = \tan \theta$.
- Q7.** a) If $z = a + ib$ and \bar{z} is the conjugate of z , find the values of a and b such that $\frac{1}{z} + \frac{2}{\bar{z}} = 1 + i$.
 b) Use De'Moivre's theorem to show that $\frac{\cos 3\theta + i \sin 3\theta}{\cos 5\theta - i \sin 5\theta} = \cos 8\theta + i \sin 8\theta$



REG. NO..... PROGRAMME..... VENUE.....

ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
SCHOOL OF SCIENCE
PHYSICS PROGRAMME

Date: April, 2012
Time allowed: 1hr 15min

NIGERIAN INSTITUTE OF
ENGINEERING
ATEBU BAUCHI
(NIMech)
DATE

1st SEMESTER 2011/2012 SESSION,
PHY 183: Introduction to Mechanics and Properties of Matter
Instructions: Answer all questions
Circle the letter of the correct option
You may use the following constants where necessary, $G = 6.7 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$; density of sea water = 1025 kg/m^3 ; $g = 10 \text{ m/s}^2$

1. When an object is thrown-up at an angle of 30° to the vertical A) the object horizontal velocity is constant
B) at the highest point the total velocity is zero C) at the highest point the vertical velocity is zero
D) none of the above
2. Which of the following is the dimension of work? A) ML^2T^2 B) $\text{L}^2\text{T}^2\theta^{-1}$ C) TI D) ML^2T^3
3. Shear modulus expresses the extent of relative angular moment of adjacent molecular planes by the shearing force. If an angular displacement is 1.2° , what is the shear strain A) 1.200 B) 0.500 C) 0.021
D) 0.050
4. The total external forces acting on a body is zero only if the object is I) at rest II) moving with constant velocity III) in equilibrium IV) not in equilibrium
A) I only B) II only C) IV only D) III only
5. A wire is found to increase its length by 0.5% when subjected to a tensile stress of $1 \times 10^9 \text{ Nm}^{-2}$. The Young modulus of the wire is A) $2 \times 10^{10} \text{ Nm}^{-2}$ B) $2 \times 10^{11} \text{ Nm}^{-2}$ C) $5 \times 10^9 \text{ Nm}^{-2}$ D) $5 \times 10^{10} \text{ Nm}^{-2}$
6. During a research project, deep sea photographs were made at a depth of 7.50 km. What is the pressure at this depth? A) $75,300 \times 10^3 \text{ kPa}$ B) $75,300 \times 10^6 \text{ Pa}$ C) $75,300 \times 10^3 \text{ Pa}$ D) $75,300 \text{ Pa}$
7. What is the force on the plane surface of the window of a camera enclosure that measures 12 cm x 15 cm in Q6 above? A) $1.36 \times 10^5 \text{ N}$ B) $1.36 \times 10^4 \text{ N}$ C) $1.36 \times 10^3 \text{ Pa}$ D) $1.36 \times 10^6 \text{ N}$
8. What is the pressure on the pavement if a 10-metric ton truck's weight is supported by six wheels, each having 0.01 m^2 of surface in contact with the concrete? A) $2.63 \times 10^6 \text{ Pa}$ B) $1.63 \times 10^6 \text{ Pa}$ C) $1.63 \times 10^5 \text{ Pa}$
D) $1.63 \times 10^7 \text{ Pa}$
9. Mathematically, the moment of inertia of an object about an axis can be expressed as: A) $\sum mr^2$ B) $\sum mr$
C) $\sum r^2$ D) $\sum mr^3$
10. What is the linear velocity of a point on the rim of a flywheel 2000mm in diameter if the wheel is turning at an angular velocity of 5 rad s^{-1} ? A) 1000 ms^{-1} B) 10 ms^{-1} C) 5 ms^{-1} D) none of the options
11. Which of these is a base unit? A) m/s B) N/m^2 C) second D) m^2
12. A component of vector X along the direction of vector Y is zero when A) X is perpendicular to Y B) X is at an angle of 45° to Y C) X and Y are parallel to each other D) X and Y are in opposite direction to each other
13. A disc of moment of inertia 10 kg m^2 about its centre rotates steadily about the centre with an angular velocity of 20 rad s^{-1} . Calculate its rotational kinetic energy A) 200 J B) $20 \times 10^3 \text{ J}$ C) 20 J D) $2 \times 10^3 \text{ J}$
14. Centripetal force is an inertial force when considered by A) an observer at the centre of the circular motion
B) an outside observer C) an observer who is moving with the particle that experiences the force D) an observer who is moving relative to the particle experiencing the force
15. Find the equilibrant of a force 82N at 5° east south east direction A) 82N , 5° south south west
B) 82N , 5° east north east C) 82N , 5° east south east D) 82N , 5° west north west
16. How far apart are two objects each of mass 1000 g if the gravitational force between them is 1nN (nanonewton)
A) $6.7 \times 10^{-2} \text{ m}$ B) $7.5 \times 10^{-3} \text{ m}$ C) $2.2 \times 10^{-2} \text{ m}$ D) $3.7 \times 10^{-2} \text{ m}$
17. Which of the following consists entirely of vector quantities? A) velocity, magnetic flux and reaction
B) Tension, magnetic flux and mass C) displacement, impulse and power D) work, pressure and moment

Ans. A particle executing uniform circular motion A. velocity is traverse, acceleration is radial

B. velocity is traverse, acceleration is traverse C. velocity is radial, acceleration is traverse

D. velocity is radial, acceleration is radial

15. An object of mass 2kg falls from a height of 20m above the ground. If $g = 10\text{m/s}^2$, the loss of potential energy just before the mass strikes the ground is A. 20J B. 40J C. 200J D. 400J

16. When body is acted upon by a resultant force, the work done by the resultant force is equal to A. its initial kinetic energy B. its initial potential energy C. change in kinetic energy D. change in potential energy

17. A body is dropped from rest at height 0.5cm . What will be its velocity when it just strikes the ground A. 7m/s B. 9.8m/s C. 4.9m/s D. 4.6m/s

18. An electron has mass of $9.11 \times 10^{-31}\text{kg}$. It revolves about a nucleus in a circular orbit of radius $5.29 \times 10^{-11}\text{m}$ at a speed of $2.2 \times 10^6\text{m/s}$. The linear momentum of the electron in this system will be A. $1.1 \times 10^{34}\text{kgm/s}$ B. $2.0 \times 10^{-24}\text{kgm/s}$ C. $4.0 \times 10^{-24}\text{kgm/s}$ D. $4.0 \times 10^{-34}\text{kgm/s}$

19. A proton is rotating along a circular path of radius 0.1 under a centrifugal force of $4 \times 10^{-12}\text{N}$. If the mass of the proton be $1.6 \times 10^{-27}\text{kg}$ then the angular velocity of rotation is A. $5 \times 10^7\text{rad/sec}$ B. 10^{15}rad/sec C. $2.5 \times 10^7\text{rad/sec}$ D. $5 \times 10^{14}\text{rad/sec}$

20. The moment of inertia of a body does not depend upon A. mass of the body B. the distribution of mass in the body C. angular velocity of the body D. the axis of rotation of the body



ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
MATHEMATICAL SCIENCES PROGRAMME
FIRST SEMESTER EXAMINATIONS 2012/2013 SESSION
MTH112: CALCULUS I (3 UNITS)



INSTRUCTION: ANSWER FOUR (4) QUESTIONS. ATLEAST ONE QUESTION FROM EACH SECTION
 TIME: 2½ HOURS

DATE: APRIL 19, 2013

SECTION A

Q1. Solve the following inequalities using sign chart

a) $\frac{(x-5)|x-2|}{\sqrt{2x-3}} \geq 0$

b) $(3x+5)^3|x-2| < 0$

Q2. (a) Given that $f(x) = 3x-2$, $g(x) = x/3 + 2/3$. Find

i.) $(fog)(x)$

ii.) $(gof)(x)$

(b) i.) Simplify the following $(-5, 4) \cup [2, 5]$, $(-5, 4) \cap [2, 5]$

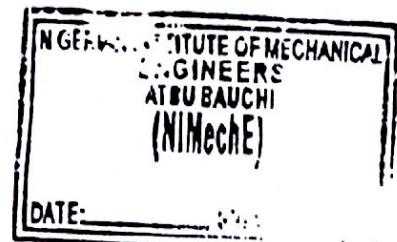
ii) Evaluate the following $\lim_{x \rightarrow 64} \frac{x^{1/2}-8}{x^{1/3}-4}$

SECTION B

Q3. Differentiate the following expressions with respect to x

(a) i.) $\sqrt{\ln x^2}$ ii.) $\sqrt{e^{x^2}}$

(b) i.) $\frac{x^2-2x}{x^2+2x}$ ii.) $\sqrt{x^3 - 2x^2} (x^3 - 3x^2 + x)$



Q4. Differentiate the following functions with respect to x

(a) i.) $y = \sqrt{\cot^3(x^3 + 1)}$ ii.) $y = \frac{\cosec 2x}{1 + \sec x}$

(b) i.) $y = \sin^{-1}(x^2 + 2x + 1)$ ii.) $y = \sqrt{\sec^{-1}(2x - 1)}$

SECTION C

Q5. (a) Evaluate the following integrals

i.) $\int \frac{dx}{x^{1/2} + x^{1/3}}$ ii.) $\int \frac{e^{\sqrt{x}} \cos(\sqrt{x})}{\sqrt{x}} dx$

(b) Using the method of integration by parts find:

i.) $\int x^2 e^{-x} dx$ ii.) $\int x^n \ln x dx$

Q6. (a) Find the solution of the following trigonometric integrals.

i.) $\int \sin^5 x \cos^4 x dx$ ii.) $\int \tan^2 x \sec x dx$

(b) Using trigonometric substitution, find the solution of the given integrals

i.) $\int \frac{dx}{\sqrt{4+16x^2}}$ ii.) $\int \frac{dx}{x^2 \sqrt{16-x^2}}$ iii.) $\int \frac{\sqrt{x^2-9}}{x} dx$

Reg. No.....

ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI.

FACULTY OF SCIENCE
DEPARTMENT OF PHYSICSSESSION
ENGLISH
AT SUBA
(NIMech)END-OF-COURSE EXAMINATION, 1ST SEMESTER 2015/2016 SESSION
PHY184: INTRODUCTORY HEAT, WAVE MOTION AND SOUND (3 UNITS)20th August, 2016

Instructions to Candidates:

I. Answer all questions.	III.	For each question, enter one of the letters A to D representing the correct option on the answer slip provided.
II. Time allowed is 1 hr, 30 mins		
iv. The following may be assumed where necessary:		
<ul style="list-style-type: none"> • Acceleration due to gravity = 10 m s^{-2}, • Speed of sound in air = 340 m s^{-1} • Specific latent heat of fusion of ice = $3.35 \times 10^5 \text{ J kg}^{-1}$, • Specific heat capacity of copper = $400 \text{ J kg}^{-1} \text{ K}^{-1}$ 	<ul style="list-style-type: none"> • Specific latent heat of vaporisation of water = $2.3 \times 10^6 \text{ J kg}^{-1}$ • Specific heat capacity of water = $4200 \text{ J kg}^{-1} \text{ K}^{-1}$ • Linear expansivity of copper = $4.2 \times 10^{-5} \text{ K}^{-1}$ 	

1. The fundamental frequency of a musical note emitted by an open-ended organ pipe is 594 Hz. What would be the note when one end of the pipe is plugged?

- A. 594 Hz B. 446 Hz C. 297 Hz
D. 149 Hz

2. Longitudinal waves of speed 8.0 km s^{-1} and transverse waves of speed 6.0 km s^{-1} from a particular earthquake focus arrive at a recording station 3 s apart. If the waves travel through straight paths, how far is the focus from the station?

- A. 72 km B. 36 km C. 48 km D. 24 km

3. The beats frequency produced when two tuning forks of frequencies 240 and 246 Hz are sounded together is?

- A. 3 Hz B. 6 Hz C. 9 Hz D. 12 Hz

4. Two strings of equal length are stretched out with equal tension. The second string is four times as massive as the first string. If a wave travels down the first string with velocity v , how fast does a wave travel down the second string?

- A. $16x$ B. $8x$ C. $4x$ D. $2x$

5. Compared to a sound of 40 decibels, a sound of 50 decibels is ... times louder.

- A. 10 B. 5 C. 2 D. 20

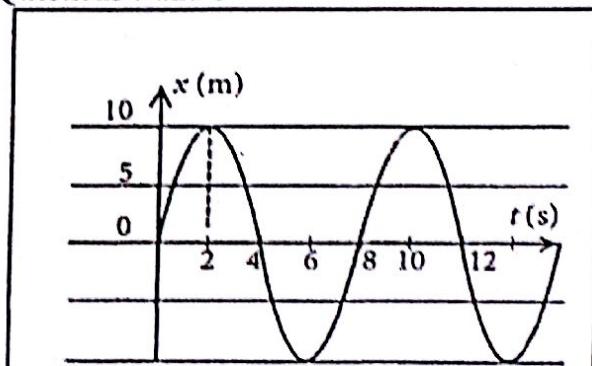
6. A heavy hemispherical bowl of radius of $37r$ placed on a horizontal table and a sphere of mass ' m ' and radius ' r ' is given a small

displacement inside its smooth surface. Its period of oscillation is?

- A. $2\pi\sqrt{m/37rg}$ B. $2\pi\sqrt{m/r}$
C. $2\pi\sqrt{r/g}$ D. $2\pi\sqrt{r/g}$

$$2\pi\sqrt{\frac{L}{2g}} = 2\pi\sqrt{\frac{r}{g}}$$

Questions 7 and 8



7. The period (s), frequency (Hz), and amplitude (m) of the oscillatory motion shown above respectively are:

- A. $\frac{1}{4}, 10$ B. $\frac{1}{4}, 4, 10$ C. $8, \frac{1}{8}, 10$
D. $\frac{1}{8}, 8, 10$

8. If the object executing the oscillatory motion has a mass 1 kg, its maximum kinetic energy (J) is:

- A. $312.5\pi^2$ B. $3.125\pi^2$ C. $0.3125\pi^2$
D. $31.25\pi^2$

9. By what factor should the length of a simple pendulum be changed if the period of vibration were to be tripled?

- A. 3 B. $1/3$ C. 9 D. 27

10. A 0.5-kg mass hung on a spring causes a 10.0 cm elongation, what will be the period (Hz) of

REG NO..... NAME..... DEPT.....

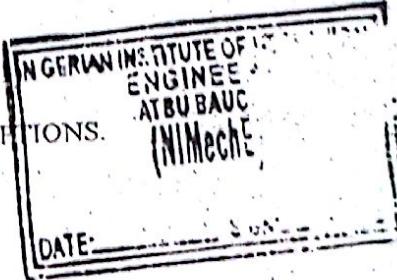
ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI

FACULTY OF SCIENCE, DEPARTMENT OF PHYSICS.

PHY 183 : MECHANICS AND PROPERTIES OF MATTER, TEST(

INSTRUCTION: ANSWER ALL QUESTIONS BY CIRCLING THE CORRECT OPTIONS.

TIME: 40min



1. The minimum sum of two vectors having magnitude of 50 and 100 is A. 120 B. 50 C. 40 D. 80
2. Which of the following is not correct A. $j \times i = -k$ B. $k \times j = -i$ C. $i \times k = -j$ D. $k \times i = -j$
3. A body is at rest under the action of three forces, two of which are $F_1 = 4i$ and $F_2 = 6j$, third force is A. $4i + 6j$ B. $4i - 6j$ C. $-4i + 6j$ D. $-4i - 6j$
4. Two bodies of mass m and $3m$ are thrown vertically upward with the same velocity. On coming back to the earth, A. they will have zero velocity B. they will have same velocity C. the body of mass $3m$ will have three times more velocity than that of mass m D. the body of mass $3m$ will have one-third velocity of that of mass m .
5. A body under the action of five forces can be in equilibrium A. if all the forces are equal B. the sum of the resolved components along X-axis is zero C. the sum of resolved components along Y-axis is zero D. the sum of resolved components along X-axis and Y-axis is individually zero.
6. When two vectors are added together their resultant is a minimum when the angle between them is A. 0 B. 90° C. 45° D. 180°
7. Relative to the force needed to keep a box moving at constant velocity across a floor, to start the box moving usually needs A. less force B. the same force C. more force D. any of the above depending on the natures of the surfaces in contact.
8. After a stone dropped from a cliff has fallen $20m$, the stone's velocity is A. $10m/s$ B. $196m/s$ C. $20m/s$ D. $392m/s$.
9. A ball is thrown 40° above the horizontal at $4.0m/s$. After $0.50s$ the horizontal component of the ball's velocity will be A. $2.6m/s$ B. $3.1m/s$ C. $3.4m/s$ D. $5.5m/s$
10. A girl throws a ball $20m$ vertically into the air. How long does she have to wait to catch it on the way down? A. $4.04s$ B. $5.05s$ C. $2.34s$ D. $1.00s$
11. A boy throws ball in air in such a manner that when the first ball is at its maximum height he throws another ball. If the balls are thrown with time interval of 1 second, when will be the height attained by them? A. $19.6m$ B. $9.8m$ C. $4.9m$ D. $2.45m$
12. A ship of mass $3 \times 10^7 kg$ initially at rest, is pulled by a force of $5 \times 10^4 N$ through a distance of $3m$. assume that the resistance due to water is negligible; the speed of the ship is A. $1.5m/s$ B. $60m/s$ C. $0.1m/s$ D. $5m/s$
13. A proton (mass = $1.6 \times 10^{-27} kg$) goes round in a circular orbit of radius $0.1m$ under a centripetal force of $4 \times 10^{-13} N$. Then the frequency of revolution of the proton will be around A. $8 \times 10^8 /sec$ B. $4 \times 10^8 /sec$ C. $2.5 \times 10^8 /sec$ D. $16 \times 10^8 /sec$



ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI
MATHEMATICAL SCIENCES PROGRAMME
FIRST SEMESTER EXAMINATIONS 2011/2012 SESSION
MTH112: CALCULUS I (3 UNITS)



INSTRUCTION: ANSWER ANY FIVE (5) QUESTIONS

TIME: 3 HOURS

DATE: APRIL 20, 2012

Q1. a) Find the range of values of x for which:

i) $\frac{2x+1}{x+2} > \frac{1}{2}$ ii) $\frac{x}{x+2} > \frac{3}{x-2}$.

b) Find the domain and the range of the following functions:

i) $y = \sqrt{4x - x^2}$ ii) $y = \sqrt{24 + 10x - x^2}$ DATE: _____

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Q2. a) Evaluate the following limits:

i) $\lim_{x \rightarrow 7} \frac{2-\sqrt{x-3}}{x^2-49}$ ii) $\lim_{x \rightarrow 1} \frac{\sqrt{x}-1}{x-1}$.

b) List three (3) basic rules of limits of a function $f(x)$.

Q3. a) Differentiate the following functions using first principle:

i) \sqrt{x} ii) $\cos 4x$.

b) If $y = e^{2x} \cos 3x$, then show that $\frac{d^2y}{dx^2} - 4 \frac{dy}{dx} + 13y = 0$.

Q4. Differentiate the following functions with respect to x .

a) $y = (\sin x)^x$ b) $y = (x)^{\sec x}$

c) $y = \sqrt{(x^2 + 1)(x - 2)^3}$ d) $y = \frac{(x^2 - 1)^2}{\sqrt{x^2 + 1}}$

Q5. Find the areas enclosed by the following curves and the x-axis. In each case sketch the curve first.

a) $y = \sqrt{x}; x = 1, x = 4$

b) $y = 1x - 21; x = 0, x = 3$

Q6. Evaluate each indefinite integral directly or by substitution method:

a) $\int \left[3x^2 - \frac{1}{\sqrt{x}} \right] dx$. b) $\int \frac{x dx}{\sqrt[6]{1-3x^2}}$

c) $\int \frac{x dx}{\sqrt{1+x}}$. d) $\int \frac{(2x+1)dx}{(x^2+x-5)^2}$.

Q7. Integrate by parts the following:

a) $\int x e^{2x} dx$. b) $\int x \cos(x) dx$

b) $\int [\ln(x)]^2 dx$. c) $\int x^2 \cdot \sin(x) dx$

Reg. No. _____
ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI.
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS
PHY 184 – INTRODUCTORY HEAT, WAVE MOTION AND SOUND

TEST No. 1 – **INSTRUCTIONS:** (i) Enter your Registration No. in the space provided above. (ii) personal information on the answer slip provided. (iii) Fill in the correct option on the answer slip. (iv) where necessary, acceleration due to gravity, $g = 10 \text{ m s}^{-2}$, speed of sound in air = 334 m s^{-1} , latent of vaporisation of water = $2.3 \times 10^6 \text{ J kg}^{-1}$ (vi) Time allowed is 30 minutes.

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 ENGINEERS
 AT BAUCHI
 (NIMechE)

Enter your
 personal information
 DATE: _____

1. By what factor should the length of a simple pendulum be changed if the period of vibration were to be tripled?
 A. 3 B. $1/3$ C. 9 D. 27
2. A 0.5-kg mass hung on a spring causes a 10.0 cm elongation, what will be the period (Hz) of vertical oscillation if it is slightly pulled down and released?
 A. $2\pi/10$ B. $2\pi\sqrt{10}$ C. $2\pi\sqrt{100}$ D. $2\pi/100$
- Questions 3 and 4
 The equation of a particular wave motion is given as:
 $y(x,t) = 0.075 \cos(1.05x - 12.6t)$
3. The frequency (Hz) of the wave is?
 A. $\pi/6.8$ B. $6.8/\pi$ C. $12.6/\pi$ D. $2\pi/6.8$
4. The wave length (m) of the wave is?
 A. $1.05/2\pi$ B. $1.05/2\pi$ C. $2\pi/1.05$ D. $2\pi/1.05$
5. Longitudinal waves of speed 8.0 km s^{-1} and transverse waves of speed 6.0 km s^{-1} from a particular earthquake focus arrive at a recording station 3 s apart. If the waves travel through straight paths, how far is the focus from the station?
 A. 36 km B. 48 km C. 60 km D. 72 km
6. Two railroad trains R and S travel in opposite directions with the speeds of 30 and 18 m s^{-1} respectively. Train R continuously emits a note of frequency f which is heard by a passenger in train S. The frequencies (Hz) of the notes heard by the passenger when the two trains are approaching and departing from each other are?
 A. $304/352 \times f$ and $364/316 \times f$
 B. $352/304 \times f$ and $316/364 \times f$
 C. $364/316 \times f$ and $304/352 \times f$
 D. $316/364 \times f$ and $352/304 \times f$
7. A 2-m 60-g rope is stretched under a tension of 500 N . The speed (m/s) of a transverse wave in the rope will be?
 A. $\sqrt{1000/6}$ B. $\sqrt{10000/6}$ C. $\sqrt{100000/6}$ D. $\sqrt{100/6}$
8. What will be the period of oscillation of a simple pendulum of length l m in a spaceship orbiting a geostationary orbit?
 A. 0 B. ∞ C. $\sqrt{l/g}$ D. ∞
9. The beats frequency (Hz) heard when two tuning forks, one of frequency 240 Hz and the other of frequency 246 Hz are sounded together is?
 A. 6 B. 3 C. 12 D. 9
10. The fundamental frequency of a musical note emitted by an open-ended organ pipe is 594 Hz . What would be the note when one end of the pipe is plugged?
 A. 594 Hz B. 446 Hz C. 297 Hz D. 149 Hz
11. The temperature range, in $^{\circ}\text{C}$, of the clinical thermometer is between
 A. 34 to 37 B. 37 to 41 C. 35 to 43 D. 41 to 43
12. One of the various type of thermometers we have can measure high temperatures up to $500 ^{\circ}\text{C}$, this thermometer is
 A. Resistance thermometers
 B. Thermoelectric thermometer
 C. Gas thermometer D. Liquid-in-glass thermometer.
13. The difference in temperature between the two temperature points is called
 A. calibrated interval B. temperature interval
 C. temperature scale interval D. fundamental interval.
14. The S.I. unit of absolute temperature is the Kelvin and it is also called.
 A. Fundamental scale B. Celsius
 C. thermodynamic D. temperature scale
15. A certain thermometer has its upper fixed point at $140 ^{\circ}\text{C}$ and its lower fixed point at $0 ^{\circ}\text{C}$. The temperature, on Kelvin scale, which corresponds to $50 ^{\circ}\text{C}$ on this thermometer is?
 A. 35.7 K B. 308.7 K C. 300 K D. 50 K
16. A certain cubical object has a length of 90 cm at $30 ^{\circ}\text{C}$ and 90.1 cm at $530 ^{\circ}\text{C}$. Calculate the coefficient of superficial expansion of the object.
 A. $2.2 \times 10^{-6} \text{ K}^{-1}$ B. $2.2 \times 10^{-4} \text{ K}^{-1}$
 C. $2.2 \times 10^{-6} \text{ K}^{-1} \text{ J}^{-1}$ D. $4.4 \times 10^{-6} \text{ K}^{-1}$
17. A copper plate has a surface area of 2.5 m^2 at $40 ^{\circ}\text{C}$, calculate its approximate surface area (m^2) when heated to a temperature of $90 ^{\circ}\text{C}$.
 A. 2.51 B. 25.1 C. 0.251 D. 2.51
18. A block of lead of mass $m \text{ kg}$ is heated electrically by a 35 W heater. If the temperature raises by $20 ^{\circ}\text{C}$ in 10 minutes, calculate the heat capacity of the lead.
 A. 750 JK^{-1} B. $750 \text{ K}^{-1} \text{ J}^{-1}$ C. 1050 JK^{-1} D. 750 K^{-1}
19. At what temperature does water condenses out of air?
 A. at dew point B. below dew point
 C. above dew point D. at saturation point
20. A heating coil rated at 1000 W is used to boil off completely 5 kg of boiling water. The time (s) required to do this is?
 A. 2.3×10^6 B. 1.15 C. 1.15×10^4 D. 115

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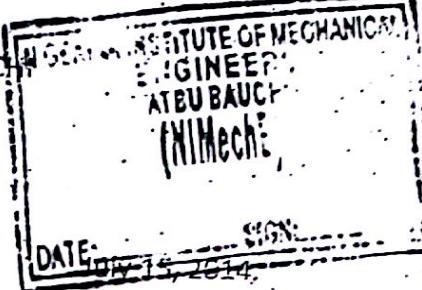
ABUBAKAR TAFAWA BALEWA UNIVERSITY, BAUCHI

FACULTY OF SCIENCE

DEPARTMENT OF PHYSICS

PHY 184

Test II



INSTRUCTIONS: Answer all questions. Time Allowed: 50 Minutes.
Use $g = 10 \text{m/s}^2$

1. The statement that the rate of loss of heat of a body by cooling in a steady stream of air is proportional to the excess temperature of the body above its surrounding is known as:

(a) Kirchhoff's law of radiation (b) Newton's law of cooling (c) Stefan's law of radiation
(d) Boyle's law (e) Charles' law.

- 2) A closed metal vessel contains water at 80°C . The vessel has a surface area of 0.5m^2 and a uniform thickness of 4mm. If the outside temperature is 15°C , calculate the heat loss by conduction per minute ($K = 400 \text{W m}^{-1}\text{K}^{-1}$). (a) 45MW (b) 40MW (c) 43MW
(d) 60MW (e) 70MW.

- 3) An electric heater of 2KW is used to heat 0.5kg of water in a kettle of heat capacity 400JK^{-1} . The initial water temperature is 20°C ; how long will it take to heat the water to its boiling point? (a) 80s (b) 100s (c) 120s (d) 50s (e) 150s.

4. Which of the following cannot be used to measure the temperature of a substance?
(a) Variation of pressure with temperature (b) Expansivity of liquid (c) Thermoelectric effect
(d) Resistivity of a metal (e) Change in colour with temperature.

5. The quantity of heat required to change the temperature of a unit mass of a substance by 1°C is called: (a) Heat capacity (b) latent heat of vapourization (c) specific heat capacity
(d) specific latent heat (e) latent heat of fusion.

6. In an adiabatic process, the energy required to do work can come only from (a) the internal energy of the gas (b) the molecules themselves (c) the work done on the gas
(d) the kinetic theory of gas.

7. An ideal gas at 300K is adiabatically expanded to twice its original volume and then heated until the pressure is restored to its initial value. The final temperature is
(a) 300K (b) 400K (c) 450K (d) 500K (e) 600K.

- The molecules of a given mass of gas have a root-mean-square velocity of 200ms^{-1} at 27°C and $1.0 \times 10^5 \text{Nm}^{-2}$ pressure. When the temperature is 127°C and the pressure $0.5 \times 10^5 \text{Nm}^{-2}$, the r.m.s velocity in ms^{-1} is
(a) $\frac{400}{\sqrt{3}}$ (b) $100\sqrt{2}$ (c) $\frac{100\sqrt{2}}{3}$ (d) $\frac{100}{3}$ (e) $\frac{50\sqrt{2}}{3}$.

vertical oscillation if it is slightly pulled down and released?

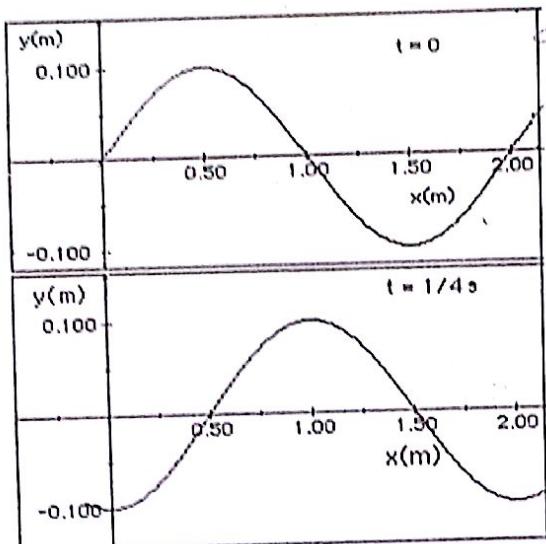
- A. 2π B. $2\pi\sqrt{10}$ C. $2\pi\sqrt{1/10}$ D. $2\pi/100$

11. Two railroad trains R and S travel in opposite directions with the speeds of 30 and 18 m s⁻¹ respectively. Train R continuously emits a note of frequency f which is heard by a passenger in train S. The frequencies (Hz) of the notes heard by the passenger when the two trains are approaching and departing from each other are?

- A. $304/352 \times f$ and $364/316 \times f$
 B. $352/304 \times f$ and $316/364 \times f$
 C. $364/316 \times f$ and $304/352 \times f$
 D. $316/364 \times f$ and $352/304 \times f$

12. Two completely identical oscillators are put in motion with the amplitude of one being four times larger than that of the other, with all other parameters of motion being identical. Their total energies will be in the ratio?

- A. 1:4 B. 1:8 C. 1:16 D. 1:24



13. The figure above represent a wave motion at two different times, $t = 0$ and $t = 1/4$ s. The wave equation is given as $y =$:

- A. $0.10\sin 2\pi(3t - x/2)$
 B. $0.01\sin 2\pi(t/3 - 2x)$
 C. $0.10\sin 2\pi(2t - x/3)$
 D. $0.01\sin 2\pi(t/2 - 3x)$

14. The speed and acceleration of a SHM of angular velocity ω , amplitude a and displaced a distance x from the equilibrium position is given as

- A. $\omega\sqrt{a^2 - x^2}$ and $\omega^2\sqrt{a^2 - x^2}$

- B. $\omega\sqrt{x^2 - a^2}$ and $\omega^2\sqrt{x^2 - a^2}$
 C. $a\sqrt{\omega^2 - x^2}$ and $a^2\sqrt{\omega^2 - x^2}$
 D. $\omega\sqrt{a^2 + x^2}$ and $\omega^2\sqrt{a^2 + x^2}$

15. Water was placed in an open U-tube to height L and depressed. When released, the water oscillates with SHM of period given as:

- A. $2\pi\sqrt{(L/g)}$ B. $2\pi\sqrt{(g/L)}$ C. $2\pi\sqrt{(2L/g)}$
 D. $2\pi\sqrt{(L/2g)}$

16. Water does not expand uniformly, as a result it contracts between?

- A. 0 to 100 °C B. 4 to 100 °C
 C. 0 to 4 °C D. 0 to 360 °C

17. Mercury and alcohol boil at X and Y °C respectively. The values of X and Y are?

- A. 78 and 780 °C B. 357 and 78 °C
 C. 100 and 780 °C D. 360 and 78 °C

18. Alcohol and mercury freeze at K and T °C respectively. The values of K and T are?

- A. -39 and -115 °C B. -111 -39 °C
 C. -115 and -39 °C D. -100 and -39 °C

19. The expansivity of alcohol is times that of mercury for the same temperature rise.

- A. 4 B. 3 C. 6 D. 2

20. Thermoelectric thermometer is recommended for temperature measurements up to?

- A. 360 °C B. 500 °C C. 380 °C
 D. 1000 °C

21. 599 °F converted to K is?

- A. 315 K B. 273 K C. 872
 D. 588 K

22. A platinum resistance thermometer has resistances of 20.8 and 22.5 Ω at the ice and steam points. The temperature when the resistance is 30.1 Ω is?

- A. 457 °C B. 547 °C C. 475 °C
 D. 745 °C

23. The volumes of a constant pressure gas thermometer are 50 cm³ at 0 °C and 120 cm³ at 100 °C. The temperature measured when the volume is 75 cm³ is?

- A. 37.5 B. 53.7 C. 35.5 D. 35.7

24. The ratio of the coefficient of linear expansion of two metals is 1.2. When heated through the

same temperature, the increase in length of the two metals is the same. Calculate the ratio of the lengths of the metals.

- A. 6:5 B. 5:6 C. 3:6 D. 6:3

25. A copper plate has surface area of 2.5 m^2 at 40°C , calculate its approximate surface area when heated to a temperature of 90°C .

- A. 2.51 B. 251 C. 5.12 D. 51.2

26. A glass vessel holds 40 g of water at 30°C and only 37.2 g when heated to 80°C . If the real cubic expansivity of the liquid is 8.5x, linear expansivity of the glass vessel is?

- A. 2.3x B. 3.2x C. 3.2x D. 2.3x.

27. A liquid has a density of 600 kgm^{-3} at 30°C . It's the density at 120°C . (?)

- A. 958 B. 598 C. 895 D. 589

28. In many cases the resistance scale is calibrated to read the temperature directly in?

- A. Kelvin B. degree C. Fahrenheit
D. none

29. The change in volume (m^3) experienced by a metal (linear expansivity = $2.0 \times 10^{-5} \text{ K}^{-1}$) sphere of radius 2 cm when heated from 30 to 330°C is?

- A. 6.1×10^{-6} B. 6.1×10^{-7}
C. 3.1×10^{-7} D. 3.6×10^{-6}

30. A certain cube has lengths of 90 cm at 30°C and 90.1 cm at 530°C . Its coefficient of superficial expansion is?

- A. 2.4x B. 4.2x C. 4.4x D. 4.8x

31. In an adiabatic process, the energy required to do work can come only from?

- A. the internal energy of the gas
B. the molecules themselves
C. the work done on the gas
D. the kinetic energy of gases.

32. An ideal gas at 300 K is adiabatically expanded to twice its original volume and then heated until the pressure is restored to its initial value. The final temperature is

- A. 300 K B. 400 K C. 450 K
D. 600 K

33. At pressure P and absolute temperature T a mass M of an ideal gas fills a closed container of volume V. An additional mass $2M$ of the

same gas is introduced into the container and the volume and temperature reduced to V and T. The pressure of the gas will be?

- A. P B. 3P C. 9P D. 27P

34. The molecules of a given mass of gas have a root-mean square velocity of 200 m/s at 27°C and $1.0 \times 10^5 \text{ N m}^{-2}$ pressure. When the temperature is 127°C and the pressure $0.5 \times 10^5 \text{ Nm}^{-2}$. The root-mean square velocity (m s^{-1}) is?

- A. 50 B. 100 C. 200 D. 400

35. Graham's law of diffusion states that the rate of diffusion of a gas is inversely proportional to the ...?

- A. square of density
B. square root of pressure
C. square root of relative molecular mass
D. square root of density.

Questions 36 to 38

An ideal gas is contained in a vessel at 300 K. If its temperature is increased to 900 K, the factor of change in the ...

36. average kinetic energy of the molecules is?

- A. 9 B. 3 C. 6 D. 1

37. root-mean square molecular speed is?

- A. 6 B. 9 C. 3 D. 1

38. pressure of the gas is?

- A. 9 B. 6 C. 1 D. 3

39. A gas is at 200 K. If we wish to double the root-mean square speed of its molecules, to what value should its temperature (K) rise?

- A. 283 B. 400 C. 566 D. 800

40. If an ideal gas undergoes an adiabatic expansion or compression, then

- A. $P^{-1}V^\gamma = \text{Constant}$ B. $PV^{-\gamma} = \text{Constant}$
C. $PV^\gamma = \text{Constant}$ D. $PV^{\gamma-1} = \text{Constant}$

41. For isothermal processes, the entropy change is?

- A. 0 B. 2 C. 4 D. 8

42. Which of the following assumptions in kinetic theory of gases is incorrect?

- A. motion of molecules is random
B. attraction between molecules is negligible
C. molecules behave as perfectly elastic spheres
D. volume of molecules is negligible compared to gas volume

$$\frac{2.0 \times 10^{-5}}{4} \neq \frac{330 - 30}{30 - 27}$$
$$1.5 = \frac{40}{9} \quad \frac{40}{9} = \frac{225}{x}$$
$$x =$$

43. 100 g of ice at 0 °C is melted and converted to water at 0 °C. The entropy change in J K⁻¹ is?

- A. 1223 B. 1123 C. 0 D. 273.

44. The unit of the universal gas constant, R is?

- A. Joules K kmol⁻¹ B. K kmol⁻¹ Joules⁻¹

- C. Joules kmol⁻¹ K⁻¹ D. kmol Joule⁻¹ K⁻¹

45. Which of the following gas laws is incorrect?

- A. PV = Constant B. PT/V = Constant

- C. P/T = Constant D. V/T = Constant

46. The quantity of heat required to raise the temperature of 500 g of copper from 16 to 56 °C?

- A. 40,000 J B. 20 kJ C. 2,000 J D. 8 kJ

47. Two metals X and Y both loose the same quantity of heat when their temperatures fell from 16 to 10 °C. The specific heat capacity of X is half that of Y. Then the ratio of mass of X to that of Y is?

- A. 3:1 B. 2:1 C. 1:2 D. 1:3

48. The molar heat capacity of an ideal gas at constant pressure is?

- A. greater than the molar heat capacity at constant volume

- B. less than the molar heat capacity at constant volume

- C. equal to the molar heat capacity at constant volume

- D. equal to the universal gas constant

49. The heat required to change 4g of ice to water at the melting point is called the?

- A. latent heat B. specific latent heat

- C. heat capacity D. specific heat capacity

50. Shawls are wrapped around babies to keep them warm because shawls?

- A. are poor conductors B. are poor radiators

- C. have pockets of air trapped

- D. conducts heat to the baby

51. In stirring a hot liquid most of the heat is lost by

- A. convection B. radiation

- C. conduction D. evaporation

52. When some ice cubes are added to a glass of warm water, the glass is cooled by a process of?

- A. conduction only B. convection only

- C. conduction and convection

- D. conduction and radiation

53. The rate of cooling of a particular body by radiation only is proportional to the?

- A. temperature

- B. fourth power of temperature

- C. fifth power of temperature

- D. square of temperature

54. The rate of conduction of heat in a solid depends upon?

- A. temperature gradient and cross sectional area

- B. the excess temperature and cross sectional area

- C. the temperature of the surroundings and cross sectional area

- D. the specific latent heat of the body

55. Which of the following statements is not correct?

- A. Evaporation takes place only at the surface of a liquid

- B. Boiling takes place throughout the volume of a liquid

- C. Evaporation takes place at all temperatures

- D. The boiling point of a liquid is not affected by impurities,

56. Which of the following processes does not reduce heat lost from a liquid in a calorimeter?

- A. Lagging the calorimeter

- B. Using insulating lids

- C. Constantly stirring the liquid

- D. Shielding the calorimeter from draughts

57. Ice is used so successfully as a coolant for drinks because?

- A. it melts B. it absorbs heat as it melts

- C. it gives out heat as it melts

- D. it absorbs radiation as it melts

58. The predominant heat transfer in metals is by?

- A. convection B. radiation

- C. evaporation D. conduction

59. How much heat is required to convert 20 g of ice to water at 80 °C?

- A. 1.35×10^3 J B. 5.38×10^3 J

- C. 6.70×10^3 J D. 7.34×10^3 J

60. The SI unit of thermal conductivity is?

- A. $\text{W m}^{-2}\text{K}^{-1}$ B. $\text{W m}^{-1}\text{K}^{-1}$

- C. $\text{W m}^{-2}\text{K}^{-4}$ D. W m K^{-1}