کراچی یونیورسٹی

University of Karachi

Department of Mathematics

MATH 725: Anthromathematics I

Time Allowed: 3 hours • *Maximum Marks*: 80 • *Date*: Friday, December 20, 2013 • *Paper Format*: A

*Student's Name*_____ (in CAPITAL LETTERS using a "**marker**")

Attempt all questions. Each part of Question 1 *is of* 4 *marks and Questions* 2-7 *are of* 10 *marks each. Note down the time spent on solving each part of question and time spent on revision by making the following "Time Chart" on the answerbook front page* **(2 marks)**. *Time spent on revision must be at least* 10% *of the total time.*

Q. No.	1a	1b	1c	1d	2	3	4	5	6	7	Revision
Time (min)											

a) DO NOT TURN PAPER AROUND unless the invigilator says: *Start* now

b) This is a closed-book examination. Deposit all BOOKS, NOTES, MOBILE PHONES (switched off), DIGITAL DIARIES and LAPTOPS in the designated area. Remove everything from your desk, except markers, pens, pencils, stapler and calculator.

c) If you want to use a calculator, **it must bear a "*sticker*"** displaying your NAME and your SEAT NUMBER, large enough so that it is visible from a distance of 5 meters. **Absolutely, NO sharing of calculators.**

d) Use your own material. **Nothing can be borrowed from or given to** a friend.

e) The papers may be of different formats. Therefore, work on your own ***without consulting anyone*** (We have a record of your seating arrangement).

f) Write your "**NAME**" on all pages of ***your question paper*** (5 marks shall be deducted for failing to comply) [NOTHING ELSE SHOULD BE WRITTEN ON THE QUESTION PAPER] and "**PAPER FORMAT**" on the front page of ***your answerbook*** (the upper-right-hand corner) and ***the Yellow Sheet*** using a "**marker**". Start your work from **Page 2** of your answerbook. The only thing that could be written on the front page is the "*Time Chart*" (see above) and the "*Honor Statement*" (see below).

g) The following statement must be copied on the front page of your answerbook and signed **(2 marks)**: "*My signatures, below, testify that I am the person, whose name and photograph appear on the Admit Card. Upon my honor, I declare that the following work is my own, completed without giving or receiving unacknowledged help, without copying, or the use of any unfair means*." Signatures_____

h) This paper contains TWO PAGES (this page and the back page). On invigilator's signal (*Start now*) turn the paper around, check if you have the back page printed, correctly. Last line of the second page reads: <**END**>. Start working on the paper, immediately.

i) Put your pens down and your papers turned (so that this page is facing you) and the FRONT PAGE of your answerbook should be facing you as soon as you hear "**ALL PENS DOWN**". Failure to do as directed shall result in "deduction of 5 marks" from your score.

j) If you use extra copies, it is "**your responsibility**" to write YOUR NAME, COPY NUMBER and all OTHER INFORMATION on each copy used. All the extra copies must be stapled with the main copy, before turning in your paper (you may wish to bring in a stapler with you for this purpose).

k) If you have a question of "Fill in the blanks" in your paper you must write the complete sentence with the filled word underlined.

l) Nobody is allowed to leave the examination hall, **for whatsoever reason**, once the examination has started. Bring your own DRINKING WATER.

m) Students are not allowed to LEAVE THEIR SEATS or STAND UP during the examination. If you have a query, "raise your hand" and someone will help you.

n) All work, including rough work, must be on the official answerbook. No extra sheet may be used.

o) Students are *not* allowed to use RED anywhere. All work (except figures) must be in pen or ballpoint.

p) The result shall be displayed on my homepage on **Friday, January 3, 2014** at **0900h**. DO NOT contact the Course Supervisor. Students are not permitted to see the answerbooks.

q) Anyone found cheating in the examination should be facing disciplinary action, which may result in **EXPLUSION** or **SUSPENSION** for 2 or more years. **Absolutely, no conversation among students. DON'T TURN THE PAPER, YET.** *Wait for "signal" from the invigilator.*

Course Supervisor

Homepage: http://ngds.uok.edu.pk/kamal
e-mail: sakamal(at the rate of)uok.edu.pk

*Student's Name*_____ (in CAPITAL LETTERS using a "**marker**")

1-*a*) Compute the obesity profile of the following female (SGPP-KHI-20081012-01) [height = 153.4 *cm*; gross mass = 53.1 *kg*; clothing correction = 0.5 *kg*, dress code = 2/2, date of birth = 1975-08-11, date of check up = 2009-11-01] using the height and weight data:

Percentiles	*3*	*5*	*10*	*25*	*50*	*75*	*90*	*95*	*97*
Height (cm)	151.50	152.50	154.75	159.00	163.50	167.50	172.50	174.00	175.25
Mass (kg)	45.25	46.50	48.25	52.25	55.25	66.00	75.25	82.50	88.75

1-*b*) In the following table we have dates of check up for a child. Compute her age at each check up in decimal form, using the date of birth given (note that each month has different number of days, leap year has 29 days in February):

ZY	*Year-Month-Day*
Date of Birth	1995-08-22
First Check-up	2002-02-06
Second Check-up	2003-01-29

1-*c*) Correlation model of growth was put forward by _____ (*Karlberg, Whittaker, Argyle*). If percentile of height of an individual lies below 3, and that of mass above 97, status (pertaining-to-mass) is not determinable. _____ (*correct, incorrect, not enough information to make a decision*). Children are, generally, _____ (*shorter, taller, same*) in the evening as compared to early morning. Tolerance levels set for statuses (pertaining-to-mass) and (pertaining-to-height) are _____ (*0, 1, 2*) percent.

1-*d*) What is the difference between mass and weight? List one instrument each to measure mass and weight of a child. List the sources of error and sources of hazard/injury in the measurement of weight.

2-*a*) By drawing a diagram explain ICP model of growth. Which hormone is released during infancy-to-childhood phase transition and which during childhood-to-puberty phase transition?

2-*b*) In the ICP-time-series graph, which physiological parameters are represented by the *x* and the *y* intercepts? What is the difference between recumbent length and standing height? Which one is greater?

3-*a*) Define anthromathematics. How anthropometry is different from anthromathematics? List some branches of anthromathematics.

3-*b*) Describe box interpolation. What are the two routes followed for calculations. Which route is preferable?

4-*a*) Define optimal mass. When was it first introduced and where? Define statuses wasting and obesity in terms of optimal mass.

4-*b*) How can a child maintain optimal mass through diet, exercise and lifestyle adjustment?

5-*a*) Define sagittal plane, frontal plane, transverse plane, transverse axis, longitudinal axis and anteroposterior axis as used in biomechanics.

5-*b*) Prove $m = m_a + m_b - m_{a+b}$, where m is net mass (mass with zero clothing on), m_a mass with one set of clothing worn, m_b mass with the other set of clothing worn and m_{a+b} mass with both sets of clothing worn (this formula could be used to compute nude mass without asking the subject to disrobe completely), and write the equivalent formula for computing nude weight.

6) How can the activity of measurement of weight be used to teach concepts in different disciplines, *e. g.*, Biology, Chemistry, Engineering, Health and Safety, Mathematics as well as Physics? A medical student (she just started her clerkship in pediatrics) and a professional anthropometrist (who forgot his glasses on the day of measurement), both took masses of a 6-year-old boy. The data are given below. By computing accuracy and precision, identify medical student/anthropometrist (measurer A or B) — reference value of mass is 17.2 *kg*:

Masses (kg)	*1st*	*2nd*	*3rd*	*4th*	*5th*
Measurer A	17.1	17.0	17.4	17.5	17.8

7) Write short notes on any TWO of the following:
   - *a)* Drawbacks of BMI
   - *b)* Difference between percentage and percentile
   - *c)* Vitamin-D Deficiency in Children

Web address of this document: http://www.ngds-ku.org/M725-6/Exams725-6/725-13_Paper.pdf
(to be uploaded 12 hours after the conclusion of examination)

Exam-paper solution: **First Class of MATH 726: Anthromathematics II**

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