TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Business & Social Studies

DEPARTMENT OF BUSINESS STUDIES

UNIVERSITY EXAMINATIONS FOR
MASTERS IN BUSINESS ADMINISTRATION
MASTER OF SCIENCE IN HRM

BMS 5202: QUANTITATIVE TECHNIQUES

SPECIAL/SUPPLEMENTARY EXAMINATIONS
SERIES: FEBRUARY 2015
TIME: 3 HOURS

INSTRUCTIONS:

- Answer **ONE** and any other **THREE** questions.

This paper consists of Four printed pages

QUESTION 1

a) Outline **FIVE** advantages of Quantitative Techniques. **(5 marks)**

b) Given the following matrices:

$$A=\begin{pmatrix}1 & 0\\ 0 & -1\\ 2 & 1\end{pmatrix} \quad B=\begin{pmatrix}1 & 3\\ 0 & 1\\ 4 & 1\end{pmatrix} \quad C=\begin{pmatrix}3 & 2 & 4\\ 1 & 0 & -1\end{pmatrix}$$

Find:

i) $A-3B$

ii) $2C^T+A$

iii) $A-C$

iv) C.A

v) 3 A.B

(5 marks)

c) Find the inverse of

$$\begin{pmatrix} 4 & -7 & 6 \\ -2 & 4 & 0 \\ 5 & 7 & -4 \end{pmatrix}$$

d) Use Gauss-Jordan method to show that the system has infinite many solutions:

$$x - y + 2z - \omega = -1$$
$$2x + y - 2z - 2\omega = -2$$
$$-x + 2y - 4z + \omega = 1$$
$$3x - \quad 3\omega = -3$$

(8 marks)

QUESTION 2

a) Discuss the distinctive features of the binomial and normal distribution. When does a binomial distribution tend to become a normal distribution? **(7 marks)**

b) In a large city, 50% of the people choose a movie, 30% choose dinner and a play, and 20% choose shopping on a leisure activity. If a sample of five people is randomly selected, find the probability that three are planning to go to movie, one to a play, and one to a shopping mall. **(3 marks)**

c) A sale firm receives, on the average, three calls per hour on its toll-free number. For any given hour, find the probability that it will receive the following:

i) At most three calls
ii) At least three calls
iii) Five or more calls

(15 marks)

QUESTION 3

a) With an aid of example, illustrate how we can measure hypothesis using multiple regression equation with three independent variables. **(10 marks)**

b) A study was conducted to determine whether there is a relationship between strength and speed. A sample of 20 year old males was selected. Each was asked to do push-ups and to run a specific course. The number of push-ups and the time it took to run the course in (seconds) are given below.

Push-ups, x	5	8	10	10	11	13	15	18	23
Time, y	61	65	43	56	62	73	48	49	50

i) Determine the least square regression line of fuel consumed on January length.

ii) Determine the coefficient of correlation

iii) Determine the coefficient of determination.

(15 marks)

QUESTION 4

a) A monthly magazine claims that over 40% of its subscribers have an annual income of over Kshs. 20,000. In a random sample of 121 subscribers some 60 had incomes in excess of this figure. Use these data to test the magazine's claim at the 5% level.

(8 marks)

b) A building contractor buys were roads from a given supplier and from past experience he knows that the breaking strain of the rod is normally distributed with mean 200Kg and standard deviation of 25kg. An alternative supplier claims to be able to supply roads of similar quality at a lower cost, and agrees to give a sample of 25 such roads to the builder for test purposes. Amongst these the builder finds a mean breaking strain of 190Kg. use this information to construct a test of the hypothesis that the two suppliers produce roads of equal quality against the one talked alternative that the new suppliers roads are inferior. **(8 marks)**

c) Acturial scientists in an insurance company formulate insurance policies that will be both profitable and marketable. For a particular policy, the lifetimes of the policyholders follow a normal distribution with $\mu = 66.2$ *years and* $\delta = 4.4$ *years*. One of the options with this policy is to receive a payment following the 65^{th} birthday and a payment every 5 years thereafter.

i) What percentage of policyholders will receive at least one payment using this option?

ii) What percentage will receive two or more payments?

iii) What percentage will receive exactly two payments. **(9 marks)**

QUESTION 5

a) Different the following functions with respect to t

i) $y = (4t^3 - 3t)^6$

ii) $y = \dfrac{2}{(2t^3 - 5)^4}$

(10 marks)

b) Given that $2y^2 - 5x^4 - 2 - 7y^3 = 0$, find $\dfrac{dy}{dx}$

(5 marks)

c) Differentiate $y = \dfrac{x^3 \ln 2x}{e^x \sin x}$ with respect to x.

(5 marks)

d) Integrate the following functions:

i) $\int_1^2 4e^{2x}\ dx$

ii) $\int_1^4 \frac{3}{4\mu}\ du$ **(10 marks)**

QUESTION 6

a) Explain when you would use the Mann-Whitny test, when you would use the two-sample test, and when you would use Krusleal Wallis test. Discuss your reasons for choosing each test in the appropriate situation. **(12 marks)**

b) An article in money compares investment in an income annuity, offered by insurance companies, and a mine of low-cost mutual funds, suppose the following data are annualized returns (in present) randomly sampled from these kinds of investments.

Income annuity: 9, 7.5, 8.3, 6.2, 9.1, 6.8, 7.9, 8.8 mutual funds, mix 10, 10.5, 11, 8.9, 12.1, 10.3, 9.1, 9.7

Using Mann Whitney test, determine which investment made, if either is better than the other.
(13 marks)