TECHNICAL UNIVERSITY OF MOMBASA
Faculty of Business & Social Studies

DEPARTMENT OF BUSINESS STUDIES

UNIVERSITY EXAMINATIONS FOR
MASTERS IN BUSINESS ADMINISTRATION

BMS 5202: QUANTITATIVE TECHNIQUES

END OF SEMESTER EXAMINATIONS
SERIES: APRIL 2015
TIME: 3 HOURS

INSTRUCTIONS:

– Attempt question **ONE (Compulsory)** and any other **THREE** questions
– Do not write on the question paper.

This paper consists of Five printed pages

QUESTION 1 (Compulsory)

a) Distinguish between the following:
   i) QT and management
   ii) Solving the model and validating the model. **(4 marks)**

b) Given the following matrices:

$$A = \begin{pmatrix} 4 & 0 \\ 0 & 7 \\ 6 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 4 & 6 \\ 2 & 7 \\ 6 & 1 \end{pmatrix} \quad C = \begin{pmatrix} 4 & 2 & 6 \\ 1 & 8 & 7 \end{pmatrix}$$

Find

i) A.B

ii) C^T

iii) $C.C^T$

iv) B.C

v) C.B **(10 marks)**

c) Find the inverse of $\begin{pmatrix} 1 & 5 & -2 \\ 3 & -1 & 4 \\ -3 & 6 & -7 \end{pmatrix}$

d) Solve the following system of linear equation

$2x_1 - 4x_2 + 5x_3 = 36$

$-3x_1 + 3x_2 - 7x_3 = -7$

$5x_1 + 3x_2 - 8x_3 = -31$

(6 marks)

QUESTION 2

The table below summarizes the production of livestock and livestock products in UK.

Livestock and Livestock Products, Great Britain

	Type	1981	1990	1991	1992
Bacon and ham ('000 tons)	Product	203	180	16	167
Beef and veal ('000 tons)	Product	1,021	997	1,023	970
Cattle and calves ('000 head)	Livestock	13,224	12,059	11,866	11,788
Eggs (million dozen)**	Product	1,024	811	822	812
Milk (million litres)	Product	15,973	14,535	14,075	13,995
Mutton and lamb ('000 tons)	Product	282	393	418	392
Pigs ('000s head)	Livestock	8,008	7,449	7,596	7,608
Pork ('000 tons)	Product	744	749	797	805
Poultry ('000 head)	Livestock	80,297	92,341	94,644	91,963
Poultry meat ('000 tons)	Product	788	1,027	1,074	1,069
Sheep and lambs ('000 head)	Livestock	33,078	43,799	43,621	43,973

Required:

a) Work a report summarizing the major features of data. Include any relevant statistics, tables and graphs. **(18 marks)**

b) Describe any other information that you would require. **(7 marks)**

QUESTION 3

The table below shows a sample of 14 families selected at random; length of banking days (x) in a hotel and cost of holiday £ (y).

Customer name	Length of banking days (x)	Cost of holiday £ (y)
Smith	331	2115
John	52	1752
Peter	125	2044
King	270	2443
Light	5	1257
Duff	7	1490
Stark	207	2187
Jane	15	1545
Caroline	27	1560
David	183	1981
Caroline	36	1762
Sara	85	1875
Jane	22	1624
Mary	41	1728

The following summary statistics have been included:

$\Sigma x = 1406$

$\Sigma y = 25,363$

$\Sigma(x - \bar{x}) = 147,639.4$

$\Sigma(x - \bar{x}))(y - \bar{y}) = 385,734.1$

$\Sigma(y - \bar{y}) = 1,311,949.2$

$\Sigma x^2 = 288,842$

$\Sigma y^2 = 47,260,647$

$\Sigma xy = 2,932,904$

Required:

a) Analyze the relationship between the length of the banking and the cost for the 14 families using regression analysis. **(14 marks)**

b) What would you expect the cost of the holiday to be if you booked:
   i) 290 days in advance
   ii) 180 days in advance

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iii) 3 days in advance **(3 marks)**
   Justify your answer

c) Write a report on the analysis of the data. Indicate any additional information you would require and include any recommendation for further analysis.

QUESTION 4

A car magazine has tested the acceleration (going from 0 to 60 miles per hour) of three sports cars. Each car was tested six times (in seconds)

Car 1	6.17	7.00	6.69	6.03	5.87	6.82
Car 2	7.10	6.17	6.90	6.54	6.41	5.94
Car 3	5.88	6.89	6.32	6.49	6.34	5.82

a) Carry out one-way ANOVA. **(11 marks)**

b) Test whether there is a significant difference in the average acceleration time for the three cars.
(6 marks)

c) Write a report on your findings. Indicate any other information you would require. Detail your recommendations for further research and analysis. **(8 marks)**

QUESTION 5

The following table depicts time taken to relieve headache tested on 20 patients

Time Taken to relieve a headache (minutes)

| 30.5 | 29.1 | 20.9 | 33.7 | 28.4 | 34.7 | 37.5 | 22.8 | 18.2 | 30.7 |
| 16.8 | 34.1 | 36.4 | 25 | 18.2 | 27.2 | 25.9 | 32.8 | 31.9 | 30.2 |

Required:

a) Carry out an appropriate hypothesis test to determine the average time taken to relieve a headache with the new product is significantly different from the average taken by the established brand. Justify your answer. **(10 marks)**

b) Carry out an appropriate hypothesis test to determine whether the average time taken to relieve a headache with the new product is significantly longer than the average time taken by the established brand. Justify your answer. **(6 marks)**

c) Write a report on your findings. Describe any assumptions you have made. Indicate any further information you would require and any further analysis you would wish to perform.

(9 marks)

QUESTION 6

Balph frequently ignores Dr. Rasp's excellent advice, and does not get a good night's sleep before attending a "knowledge festival'. Balph sets about to prove that he is right and Dr. Rasp is wrong. He surveys a random sample of 42 fellow-students, and obtains data on their grade point average and the number of times this semester which they have pulled and all-nighter. He fits a regression model to the data. The Microsoft. Excel output is given below. Also given are the mean and the standard deviation of the two variables.

Regression Statistics			Mean	St. Dev.
Multiple R	0.546	AllNighters	4.71	3.24
R Square	0.298	GPA	1.92	1.18
Adjusted R. Square	0.281			
Standard Error	0.997			
Observations	42			

ANOVA

	df	SS	MS	F	Significance F
Regression	1	16.920	16.920	17.011	0.000
Residual	40	39.788	0.995		
Total	41	56.708			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	2.854	0.274	10.417	0.000	2.300	3.408
AllNighters	-0.198	0.048	-4.124	0.000	-0.296	-0.101

Required:

a) Balph has 10 all-nights this semester. Predict his grade point average. **(4 marks)**

b) Given an 80% interval for your results in Part (a). **(11 marks)**

c) Do Balph's results tend to support Balph's or Dr. Rasp's point of view? Explain. Are the findings statistically significant? **(7 marks)**

d) One number in the printout (0.048) is shaded. Show how that number was computed.

(3 marks)