



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF BUSINESS & ECONOMICS**  
**UNIVERSITY EXAMINATION FOR THE DEGREE OF MASTER OF BUSINESS**  
**ADMINISTRATION**  
**1<sup>ST</sup> YEAR 1<sup>ST</sup> SEMESTER 2016/2017 ACADEMIC YEAR**  
**KISII CAMPUS-PART TIME**

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**COURSE CODE: MBA 805**

**COURSE TITLE: QUANTITATIVE METHODS**

**EXAM VENUE:**

**STREAM: ( MBA )**

**DATE:**

**EXAM SESSION:**

**TIME: 3 HOURS**

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**Instructions:**

- 1. Answer ANY FOUR questions**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

### QUESTION ONE (15MARKS)

- a. The demand function  $Q = f(P)$  for a product is quadratic in the form

$$Q(P) = aP^2 + bP + c.$$

Where  $Q$  = quantity demanded and  $P$  = price per unit.

Three points  $(P, Q)$  which lie on the function are  $(5, 1600)$ ,  $(10, 900)$  and  $(20, 100)$ .

Required;

- i. Find the values of  $a$ ,  $b$  and  $c$  hence write the demand function **(5marks)**
  - ii. determine the quantity demanded when the price is Kshs30 **(1mark)**
- b. i. Evaluate  ${}^{10}C_6$  **(2 marks)**  
ii A committee of five people is to be selected from twenty people of which 8 are women and 12 are men. How many selections are possible if at least one woman has to be included? **(3 marks)**
- C. i Solve for  $x$  by completing square method:  $12x^2 - 15x = 18$  **(3marks)**  
ii. Determine the nature of the roots of the equation  $392x^2 + 952x + 578 = 0$   
**(1mark)**

### QUESTION TWO (15 MARKS)

- a. State the addition and multiplication theorems of probability and give two different examples illustrating the application of these theorems **(2 marks)**
- b. A salesman has 80% chance of making a sale to each customer. The behavior of each customer is independent. If two customers A and B enter, what is the probability that the salesman will
- i. Make a sale to A or B **(1mark)**
  - ii. Make no sale **(1mark)**
- c. At Kisii Naivas supermarket, 40% of the customers pay by credit cards and the payment follow a binomial distribution. Find the probability that in a randomly selected sample of 10 customers,
- i. Exactly 2 pay by credit card **(2 marks)**
  - ii. Atmost 7 pay by credit card **(3marks)**

- d. The average monthly sales of 5,000 firms are normally distributed with mean Kshs36,000 and standard deviation Kshs10,000.

Required :

- i. The number of firms with sales of over Kshs40,000. **(2 marks)**
- ii. The percentage of firms with sales between Kshs38,500 and Kshs41,000. **(2marks)**
- iii. The number of firms with sales between Kshs30,000 and Kshs40,000. **(2 marks)**

**QUESTION THREE (15 MARKS)**

a. Given the matrix  $A = \begin{bmatrix} 6 & 2 & 3 \\ 4 & 0 & 5 \\ 1 & 3 & 7 \end{bmatrix}$

Required:

- i.  $A^T + A$  **(2marks)**
  - ii.  $|A|$  **(2marks)**
- b. The manufacturer of Koca-cola Soft drinks has been facing stiff competition on its main brand Koca-cola soda. The management is considering an extensive advertising campaign for Koca-Cola soda. Currently before adverstising the transition matrix of consumer between Kola-Cola and other brands is given as:

		TO	
		Koca-Cola	Other brands
FROM	Koca-Cola	0.7	0.3
	Other brands	0.4	0.6

After advertising, the transition probability matrix concerning the behaviour of customers was give as:

		TO	
		Koca-Cola	Other brands
FROM	Koka-Cola	0.9	0.1
	Other brands	0.7	0.3

The advertising campaign is expected to cost Shs1.5 million each year. There are 560,000 consumers of soft drinks in the market and for each consumer the average profitability is Shs10 annually.

**Required:**

- i. The equilibrium state proportion of consumers using Koca-Cola before the advertising campaign. **(4 marks)**
- ii. The equilibrium state proportion of consumers using Koca-Cola after the advertising campaign. **(4 marks)**
- iii. The expected annual profit or loss after the advertising campaign. Would you recommend the advertising campaign? **(3 marks)**

#### QUESTION FOUR (15 MARKS)

A mobile phone manufacturer has recently held a three day road side exhibition on the introduction of a new model of its Sum sung Smart phones. The cost accountant has availed the sales personnel employed at each of a sample of 10 exhibitions and the number of phones booked by each one as given below:

Number of sales ladies(X)	5	8	6	8	9	3	5	4	6	6
Number of Smart phones Booked(Y)	132	160	148	156	168	102	142	98	152	142

(a)Using the above data, obtain a predictive regression line of number of smart phones booked on the number of sales ladies **(10 Marks)**

(b)If the company management projects a sales level of 500 units, how many sales ladies should they employ? **(1Mark)**

(b)Calculate the product moment correlation coefficient and briefly comment on the value obtained **(4Marks)**

#### QUESTION FIVE (15MARKS)

a. Find the derivative of the following functions

i.  $y = (10x^3 + 8x - 5)(3x + 2)$  using the product rule **(2marks)**

ii.  $y = \frac{3x^2 - x^2}{x^2 + 10}$  using the quotient rule **(3marks)**

iii.  $y = (2x^3 - 6x + 11)^5$  using the Chain rule **(2marks)**

b. The average revenue function of a firm is determined to be;

$$AR = 200 - 8Q$$

Where AR is average revenue in millions of shillings and Q is the output in units.

Investigation of the firm's cost profile shows that marginal cost (MC) is given by:

$$MC = Q^2 - 28Q + 211 \text{ (million shillings)}$$

Further investigations have shown that the firm's cost when not producing output is sh.10 million.

Required:

- i. The total cost function (2marks)
- ii. The level of output that maximizes profit (4marks)
- iii. The marginal revenue at the profit maximizing output. (2marks)

**QUESTION SIX (15MARKS)**

(a) Using relevant examples, explain the following concepts as used in set theory:

- (i) Subset (1 mark)
- (ii) Disjoint sets (1 mark)

(b) Given  $A = \{ a, b, c \}$  determine:

- (i) Power set of A ie  $P(A)$  (3 marks)
- (ii) Cardinality of  $P(A)$  (1 mark)

(c) A market researcher investigating consumers' preference for three brands of beverages namely: coffee, tea and cocoa, in Kisii town gathered the following information:

From a sample of 800 consumers, 230 took coffee, 245 took tea and 325 took cocoa, 30 took all the three beverages, 70 took coffee and cocoa, 110 took coffee only, 185 took cocoa only.

**Required:**

- i) Present the above information in a Venn diagram. (5 marks)
- ii) The number of customers who took tea only. (1 mark)
- iii) The number of customers who took coffee and tea only. (1 mark)
- iv) The number of customers who took tea and cocoa only. (1 mark)
- v) The number of customers who took none of the beverages. (1 mark)

**AREA UNDER STANDARD NORMAL CURVE**

<b>Z</b>	<b>.00</b>	<b>.01</b>	<b>.02</b>	<b>.03</b>	<b>.04</b>	<b>.05</b>	<b>.06</b>	<b>.07</b>	<b>.08</b>	<b>.09</b>
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0910	.0948	.0987	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1519	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4646	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.499	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990