UNIVERSITY OF BALOCHISTAN QUETTA

MA / MSc (ANNUAL) EXAMINATION .2014.

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Subject:- **STATISTICS** Paper:-IX **(Final)**

Operations Research (Option – I)

Time Allowed :- 3 Hours Max : Marks : 100

Note :- Attempt any Five Questions in All But Question No. 1- in section –I is compulsory and the time for Section- I is only 40 Minutes. After Expiry of the Time paper should be handed over to the supervisory staff.

SECTION –I (OBJECTIVE PORTION 20 MARKS)

Q. No. 1 Attempt any 15 questions.

I. What is an LP problem?

II. Define resource constraints.

III. What is meant by redundancy in an LP problem?

IV. Explain the Northwest Corner method.

V. Define the Decision variables.

VI. What is a Slack Variable?

VII. Define the optimal solutions.

VIII. Write down the difference between the M method and the Two-Phase method.

IX. What is a critical path?

X. Define a network.

XI. What is an objective function?

XII. What is an unbalanced transportation model?

XIII. Define a Surplus variable.

XIV. Define the FIFO and LIFO queue disciplines.

XV. What is an artificial variable?

XVI. Write down two limitations of OR.

XVII. Define the least Cost method.

XVIII. Define degeneracy in LP problem.

XIX. What is Vogel's Approximation technique?

XX. Explain the KarmarKar's method.

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UNIVERSITY OF BALOCHISTAN, QUETTA

M.A / M.Sc ANNUAL EXAMINATION 2014

STATISTICS

Subject: STATISTICAL INFERENCE **Paper: VI** Final

Time Allowed: 3 hours **Marks: 100**

NOTE: ATTEMPT ANY FIVE QUESTIONS. QUESTION NO. 1 IS COMPULSORY. TIME ALLOWED FOR QUESTION NO. 1 IS 40 MINS.

SECTION I

Q. No. 1. Fill in the blanks and mark True or False. (20)

i. If $X \sim U(3, 9)$, then $F(x) =$ _____ $3 \leq x \leq 9$.

ii. $MSE(\hat{\theta}, \theta) = V(\hat{\theta}) +$ _____.

iii. The efficiency of T relative to T' is given by the ratio $RE =$ _____.

iv. The Cramer-Rao lower bound is unique and always exists. (True/False)

v. Any one-to-one function of the set of sufficient statistics is also sufficient. (True/False)

vi. A concept that deals with the limiting behavior of the sampling distribution of $\hat{\theta}_n$ as $n \to \infty$ is _____.

vii. The maximum likelihood estimator is always unbiased. (True/False)

viii. If maximum likelihood estimator of θ is $\hat{\theta}$, then estimator of $(a\theta^2 - b)$ is _____.

ix. The difference between a simple and composite hypothesis is that _____.

x. Type-II error is not rejecting H_0 when it is false. (True/False)

xi. The _____theorem states that unbiased estimators based on sufficient statistics are unique.

xii. A test defined by the uniformly most powerful critical region is called _____.

xiii. A test of high power has a much greater chance of detecting a false _____ hypothesis.

xiv. If $Y \sim Bin(2, 5)$, then the likelihood function $L(p; 2, 5) =$ _____.

xv. A sufficient statistic $T(\boldsymbol{X})$ is called a minimal sufficient statistic if _____.

xvi. The posterior distribution is a conditional distribution. (True/False)

xvii. Let X be an observation from a uniform $(\theta, \theta + 1)$ distribution then _____ is and unbiased estimator of θ.

xviii. A random variable $Q(\boldsymbol{X}, \theta)$ is a pivotal quantity (or pivot) if _____.

xix. Order statistics are independent. (True/False)

xx. A _____ statistic captures all the information about the parameter contained in the sample.

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Subject:- **(STATISTICS)** Paper:- **VII (Final)**

Econometrics.

Time Allowed :- 3 Hours Max : Marks : 100

Note :- Attempt any Five Questions in All But Question No. 1- in section –I is compulsory and the time for Section- I is only 40 Minutes. After Expiry of the Time paper should be handed over to the supervisory staff.

SECTION –I (OBJECTIVE PORTION 20 MARKS)

Q.No.1 Attempt any five Questions.

1. Define simple linear Regression model.
2. Differentiate the mathematical model and Econometrics model.
3. Differentiate time series data and cross section data.
4. Differentiate regressor and regressent Econometrics.
5. Define Explained and unexplained Variation.
6. What is best linear unbiased estimator.
7. Differentiate R^2 and $\bar{R}^2$
8. What is meant by Colinearity? and by multi colinearity?
9. What is difference Auto-Correlation and serial correlation.
10. Define population and sample regression model

SECTION –II(SUBJECTIVE PORTION 80 MARKS) TIME ALLOWED 2:20

Attempt any Four (04) questions.

Q.No.2(a) What is Econometrics? Discuss the relationship of Econometric to Economics and Statistics?

(b) What are the goals and limitation of Econometrics?

Q.No.3 Prove that OLS estimator of β_1 and β_2 in the model $Z = \beta_1 + \beta_2 x + \epsilon$, with usual assumption are BLUE. ASO differentiate efficient and BLUE estimator.

Q.No.4 (a) Differentiate between Var $\hat{b}_o$ and Sb_o

(b) Consider the model

$Y = \beta o + \beta_1 x_1 + \beta_2 x_2 + U$

With sample Calculation as

$n = 6, \Sigma x_1 = 2, \Sigma x_2 = 1, \Sigma y = 5$

$\Sigma x_1^2 = 6, \Sigma x_2^2 = 3, \Sigma Y^2 = 11, \Sigma x_1 x_2 = 2$

$\Sigma y x_1 = 5, \quad \Sigma x_2 Y = 2$

Test the hypothesis $H_o : 2\beta o + \beta_1 \beta_2$ and compute R^2

Q.No.5 (a) Differentiate the mathematical model and Econometrics model

(b) for the linear regression

Model $Y_i = B_o + B_1 x I + \epsilon$

Find i) $\hat{\beta} = (x' x)^{-1} x' y$

ii) Variance $(\hat{\beta}) = \hat{\sigma}^2 \epsilon \quad (x x)^{-1}$

and also calculate 90% C.I for βo and β_1 for the following data.

x	3	5	7	9	11	13	15	17
y	19	17	13	9	7	5	4	3

Q.No.6(a) Derive the formula for R^2 in case of simple regression analysis?

(b) State and Prove GAUSS MARKOVE THEOREM. (With matrices approach)

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SUBJECT: **STATISTICS** PAPER: X (Final)

Population Analysis

Time Allowed for this Section:**40 Minutes** Max. Marks for this Section: **20**

SECTION – I

Note: Attempt five questions in all but question No. 1 is compulsory.

Q No. 1. a) Fill in the blanks.

i. Birth, marriages, sickness, migration are called _____.

ii. How many statistical operation of demography can be summed up briefly _____.

iii. _____ % of people in Pakistan is literate.

iv. Count all persons present at place at the time of enumeration is called _____.

v. Standard Pakistan Individual schedule contains _____ questions.

vi. The population of Pakistan in1972 was _____.

vii. Area of Sindh _____ Km^2.

viii. In Gompertz curve Log(K) =_____.

ix. In Logistic curve S is sum of _____ data.

x. The growth rate = _____.

xi. The three sources of growth of population that changes in the size of population are _____.

xii. The Life Table death rate m = _____.

xiii. In Life Table L_0 = _____.

xiv. Illegitimacy rate =_____.

xv. Fatal death rate =_____.

xvi. _____% of the years birth that were presumable omitted.

xvii. The Summary preference index 120.0 for the _____ in 1960 is obtained.

xviii. How many principal sources of error _____.

xix. How many characteristics of census _____.

xx. Traditionally there are _____ types of population in Statistics.

SECTION –II(SUBJECTIVE PORTION 80 MARKS) TIME ALLOWED 2:20

Attempt any Four (04) questions.

Q.1. What is Operations Research? Describe briefly its applications. Also discuss the various phases in solving an O.R. Problem.

Q.2. What is Reliability theory? Explain failure phenomenon of exogenous and endogenous type.

Q.3 A particular component in a complex mechanical system has negative exponential time-to failure distribution with mean time to failure of 1000 hours find.

(1) The reliability function
(2) The reliability of the component if it has to operate for 1000 hours
(3) The maximum time of operation of the component if a reliability level of at least
(i) 0.99 (ii) 0.999 is to be maintained

Q.4. What is meant by stochastic process and its classifications? Also explain the probability law of a stochastic process.

Q.5. A cosmetics manufacturing company is interested in selecting the advertising media for its product and the frequency of advertising in each media. The data collected over the past two years regarding the frequency and advertising in three medias of newspaper, radio and television and the related sales of the product give the following results.

Frequency	Television	Radio	Newspaper
1	220	150	100
2.	275	250	175
3.	325	300	225
4.	350	320	250

The cost of advertising in newspaper is Rs. 500 per appearance while in radio and in Television , it is Rs. 1000 and 2000 respectively. The budget provides Rs. 4500 per week for advertisement. Determine the optimal combination of advertising media and advertising frequency .

Q.6. Find the optimal solution of the following Linear Program

Maximize: $Z = 5x_1 + 7x_2 - 2x_4 + 2x_5$

Subject to:
$$2x_1 + 5x_2 + 3x_4 - 3x_5 \leq 80$$
$$5x_1 + 2x_2 + 2x_4 - 2x_5 \leq 30$$
$$x_2 + 6x_4 - 6x_5 \leq 42$$
$$x_1, x_2, x_4, x_5, \leq 0$$

with all variables non-negative.

Q.7. Explain any five of the following terms:

i) Service mechanism in queuing theory
ii) Notation and descriptive parameters
iii) Objective function-Decision variable.
iv) Little's formula
v) Slack and surplus variable
vi) Objective functions and Constraints
vii) Optimal and Feasible solutions
viii) Pivotal method of solution.

Q.No.7 (a) Explain what you understand by Durbin- Watson test? State the assumption required for using the D W test.

(b) Calculate d- Statistic and test for the existence of Auto-Correlation from the following data for O L S residuals (ℓt)

0.6 , 1.9, -1.8,
- 2.7 , - 2.9, 1.4
3.3 , 0.3 , 2.3
0.1 , - 1.4 , -1.1

Test the by hypothesis

Ho : $\ell = o$
H_1 : $\ell > o$
No. of Independent variable in Regression model $K = 1$; $\alpha = 0.05$
d_L = 1. 05 approx.
du = 1.34 approx.

Q.No.8 (a) What is multicollinearity and how can you detect multicollinearity

(b) What are the Consequences of near or high but not perfect multicollinearity.,

Q.No.9 (a) Write a short not on hetroce dasticity or homocedasticity

(b) What are detective Procedure of Hetrocedasiticity.

Q.No.10 (a) Write short note any Four. Adjusted Co-efficient of Determination.

(b) Dummy Variable

(c) Ordinary least Squares (OLS)

(d) Exogenous Variable and endogenous Variable.

(e) Indirect least square (I L S)

(f) Types of Multicollinearity.

Time Allowed for this Section:**2hrs 20Min** Max. Marks for this Section: **80**

SECTION – II

NOTE: Attempt any FOUR Questions from Section – II. All questions carry equal marks.

Q.No. 2. Briefly discuss sources of demographic data. (20)

Q.No. 3.a) Write down the procedure for adjustment of age data. (10)

b) Explain the enumeration of young children. (10)

Q. No. 4. Discuss the sources of error in testing the accuracy of demographic data. (20)

Q. No. 5. Define the following: (20)

i. Rates and Ratios ii. Maternal death rate

iii. Fertility iv. Net Reproduction rate.

Q. No. 6.a) Calculate the crude rates and standardized death rates of 1951 and 1965 population by direct and indirect method. (15)

Ages	1951		1965	
	P_i	D_i	p_i	d_i
0 – 9	9000	200	14000	250
10 – 19	8000	150	11000	200
20 – 49	7000	100	8000	150
50 and above	6000	50	7000	100

b) Explain the Index of Mortality Rates. (05)

Q. No. 7.a) Construct the columns of Life Tables. Let radix = 1000 and $T_4 = 35000$. (10)

x	0	1	2	3	4
d_x	150	85	62	55	40

b) Elaborate the uses of Life Table. (10)

Q. No. 8.a) Fit a Logistic curve to the following data: (15)

X	0	1	2	3	4	5
Years	1981	1982	1983	1984	1985	1986
Pop (y) (000,000)	4	5	6	7	8	9

b) Write a note of Quasi – Stable Population. (05)

Q. No. 9. Explain in detail the Post Malthusian Theory of population. (20)

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SUBJECT:- STATISTICS **PAPER: V111**

DATA PROCESSING AND STATISTICAL COMPUTING

SECTION - I

Time allowed for this section 40 minutes. Max Marks: 20

Q. NO 1) Attempt any 20 questions. All questions carry equal marks.

1. Define Manual Data processing.
2. What are low level languages?
3. What is the use of read.table() command in R?
4. Suppose Y = c(0, 1, NA, 2, NA), how can the mean of Y be found?
5. What is the difference between a vector and a matrix?
6. In Minitab X1 and C2 are given. Write the command to find the correlation.
7. What does COBOL stands for?
8. Write the name of first commercial computer.
9. To find the inverse of a matrix, R uses the _____ function.
10. What is the command in R for a pie chart?
11. Suppose X contains the values (0, 7, 8). Write down the output of X * X.
12. Write Minitab command to calculate Probability Density function.
13. Write command to find the Skewness of given data in Minitab.
14. What does "ASCII" stands for?
15. FORTRAN stands for?
16. For large systems _____ has greater responsibilities and powers and works like a traffic cop.
17. How can the sum $\sum_{j=1}^{n} j^2$ be calculated in R?
18. R can read tab delimited files? (True / False)
19. 3/0 will generate NaN in R? (True / False)
20. If q=0.67 and n=25, write Minitab command to find binomial distribution.
21. Write Minitab command to calculate 95% confidence interval for the variable"weight".
22. What does "ALU" stands for?
23. What is user interface?
24. In R, = = is used for _____.
25. The output of 119 %/% 13 is _____.
26. The standard deviation can be found in R using _____ command.
27. What is Analog computer?
28. What are the categories in which software is often divided?
29. What are the two commonly used assignment operators in R?
30. To round off a number in R, the _____ command is used.

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M.A/M.Sc. ANNUAL EXAMINATION 2014
SUBJECT:- STATISTICS PAPER: VIII

DATA PROCESSING AND STATISTICAL COMPUTING
SECTION - II

Time allowed for this section 2:20 minutes. Max Mark: 80

Note: Attempt FOUR questions. Select At least ONE Question from each part. All questions carry equal marks.

PART I

Q. No 2. a) Explain any three different generations of computer in detail. (08)
b) What is operating system? Explain the main ways in which operating system is categorised. (06)
c) Briefly define different types of memory. (06)

Q. No 3. a) Solve the following. (12)
i) $(A3D9)_{16} = (\ ?\ )_2$ ii) $(F4C)_{16} = (\ ?\ )_{10}$
iii) $(345)_8 = (?)_2 = (?)_{16}$ iv) $(8F97)_{16} + (D54C)_{16} = (?)_{16}$
v) $(1000110)_2 = (\ ?\ )_{10}$
b) Discuss the different types of data. (05)
c) Define characteristics which differentiate microprocessors. (03)

Q. No. 4. a) Write brief notes on following. (10)
i) Integrated circuits ii) Data processing categories
iii) Types of computer
b) Define flow chart and also discuss its symbols. (05)
c) What is Application software? Discuss its types. (05)

PART II

Q. No. 5. a) Write a program in Minitab for χ^2 distribution to show that as the degree of Freedomincreases the distribution shifts to the right. (10)
b) Write Minitab program to simulate 500 tosses of a coin by Bernoulli process with a Tail viewed as a success. (05)
c) Write a program in Minitab to find the correlation and linear regression for the following data. (05)

Age (X)	13	14	15	16	17	18	19	20
Height (Y)	25	28	30	32	24	37	39	41

Q. No. 6. a) Write Minitab program to graph standard normal probability distribution.(10)
b) Write a Minitab program to obtain binomial probability and cumulative distribution using p= 0.5 and n = 35. (05)
c) Write a program in Minitab to draw the shape of uniform distribution. (05)

PART III

Q. No 7. a) What the following functions in R used for? (10)

i.	rbind()	ii.	exp()	iii.	summary()
iv.	solve()	v.	hist()	vi	length()
vii.	t()	viii.	max()	ix.	t.test()
x.	dim()				

b) Discuss different data types available in R and give example of each type (10)

Q . No. 8. a) Let S=matrix(rep(1:4, c(4,1,4,1)), nrow=4, byrow=T) (10)
What will be the output of following commands?

i.	S	ii.	S[, -c (1:3)]	iii.	cbind(S, -S)
iv.	colMeans(S[,c(1,3)])	v.	S %*% t(S)		

b) What will be the output of the following R commands? Where x = 10 and y = 0:10 (10)

i.	floor(x+0.8)	ii.	length(x[-1])	iii.	sum(y < 5)
iv.	y[-1]	v.	rep(y,(x-8))		

Q. No. 9. a) The data y=c(33,44,29,16,25,45,33,19,54,22,21,49,11,24,56,12,11,15) contain sales of milk in liters for 6 days in three different shops (the first 3 values are for shops 1, 2 and 3 on Monday, etc.) Write commands in R to produce a statistical summary of the sales for each day of the week and also for each shop. (15)

b) Briefly discuss R as astatistical package and its advantages and disadvantages with Minitab. (05)

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Subject:- **Statistics** Paper:- I **(Prev)**

Statistical Method

Time Allowed :- 3 Hours Max : Marks : 100

Note :- Attempt any Five Questions in All But Question No. 1- in section –I is compulsory and the time for Section- I is only 40 Minutes. After Expiry of the Time paper should be handed over to the supervisory staff.

Calculator and Tables are allowed

SECTION –I (OBJECTIVE PORTION 20 MARKS)

Q.No.1(a) Tick the correct answer.

I. The range of normal distribution is

a) 0 to n b) 0 to ∞ c) – 1 to + 1 d) - ∞ to + ∞

II In normal distribution

a) Mean = median = mode
b) Mena < median < mode
c) Mean > median > mode
d) Mean ≠ median ≠ mode

III The parameter of the normal distribution are

a) μ and σ^2
b) μ and σ
c) np and nq
d) n and p

IV Any population constants is called a

a) Statistic
b) Parameter
c) estimate
d) estimator

V The difference between a statistic and the parameter is called

a) Probability
b) sampling error
c) random
d) non random

(b) Briefly explain the following questions.

I define the something error?

II define a random sample ?

III Explain the statistical inference?

IV Explain the based estimator

V What is mean by composite hypothesis?

VI What is Type I and Type II error

VII What is power of a test?

VIII Distinguish between positive and negative correlation?

IX Given $\bar{x} = 1$, $\bar{Y} = 8$ and $b = 2$ find the value of intercept a.

X. If $b_{yx} = -1.6$ and $b_{xy} = -0.4$ find the value of r_{xy}.

(C) Fill in the blanks

I The standard deviation of some statistic is called the ..... of that statistic

II The study of all the data points in a population is called a .....

III Probability distribution of a statistic is called .....

IV The dependent variable is also called .....

V The correlation coefficient is the ..... of two regression coefficients.

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Subject:- **STATISTICS** Paper:-II **(Prev)**

Experimental Design

Time Allowed :- 3 Hours Max : Marks : 100

Note :- Attempt any Five Questions in All But Question No. 1- in section –I is compulsory and the time for Section- I is only 40 Minutes. After Expiry of the Time paper should be handed over to the supervisory staff.

SECTION –I (OBJECTIVE PORTION 20 MARKS)

Qnot1) Note: Attempt any 10 Questions. All Questions carry 2 marks each.

1) Define Design of Experiment.
2) What is Experimental Unit?
3) Define Treatment.
4) What is Error?
5) What is Experimental Error?
6) What is Standard Error?
7) Define Type-II Error.
8) What are the two main sources of Experimental error?
9) Simply construct the layout of 5 x 5 Latine Square Design.
10) Mention any two advantages and dis-advantages of Latine Square Design over RCB design.
11) Define any three basic assumptions of analysis of variance.
12) What does BIBD stands for?
13) What does PBIBD stands for?
14) Define the model of RCB design.
15) How SSE is computed for Greaco Latine Square Design

SECTION II

Time allowed : 2 : 20 minutes Max Marks: 80

Note: Attempt any 4 Questions, All questions carry equal marks.

Qno 2) a) Explain briefly the basic principles of Experimental design.

b) Discuss the properties of good experiments.

Qno3) Write short note on any two of the following.

i) Factorial Experiment ii) Confounding iii) Split Plot Design

Qno4) Explain a) The Analysis of Covariance. b) Assumptions of the Analysis of Covariance

c) Uses of the Analysis of Covariance.

Qno5) What do you understand by Multiple Comparison Test? When these are used?

a) For the following RCB Design estimate the missing value then analyze the data.

BLOCK	TREATMENT		
	A	B	C
1	5	12	15
2	8	16	X
3	7	10	14
4	9	13	13

Qno 6) Carryout the analysis of variance for the following Latine Square.

A_7	D_9	E_6	B_{12}	C_{14}
C_{12}	B_7	A_9	E_9	D_8
D_{10}	C_{18}	B_9	A_9	E_7
E_9	A_{10}	C_{16}	D_{11}	B_7
B_{12}	E_9	D_{14}	C_{18}	A_{10}

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Subject:- **(STATISTICS.)** Paper:- **IV (Prev)**

Sampling Techniques.

Time Allowed :- 3 Hours Max : Marks : 100

Note :- Attempt any Five Questions in All But Question No. 1- in section –I is compulsory and the time for Section- I is only 40 Minutes. After Expiry of the Time paper should be handed over to the supervisory staff.

SECTION –I (OBJECTIVE PORTION 20 MARKS)

Q.No.1 Write short answers of the 20 following Questions.

1. Define W.O.R?
2. Define $E(\bar{y})$ =_____?
3. Write Formula v $\hat{R}$ = _____?
4. Write Formula MSE ($\hat{R}$) = _____?
5. Existent Population?
6. Statistical population?
7. Define survey?
8. Define Bias?
9. Define Estimation?
10. Properties of Good point Estimator?
11. Random sample?
12. Write formula N_c =_____?
13. $\frac{1}{N} + \frac{1}{N} + \frac{1}{N}$ + _____ + $\frac{1}{N}$ = _____?
14. Define Estimator.
15. Define efficient Estimator?
16. Write Formula S^2 = _____?
17. Define Regression.?
18. Define Correlation?
19. Define BLUE?
20. Define MSE.?
21. Define FPC?
22. Write Range of Correlation?
23. Write Rang of Regression?
24. Is an estimator a random variable? Why or why not?
25. Define Strata.?
26. What is census?
27. Write about b and bo in regression estimator?
28. When FPC is ignored?
29. Define sample design?
30. Define Consistent?

SECTION –II(SUBJECTIVE PORTION 80 MARKS) TIME ALLOWED 2:20

Attempt any Four (04) questions.

Q.No.2 (a) Explain survey and what are the main steps in a sample survey.

(b) If $y_{i,\ xi}$ are a pair of variates defined on every unit in the population and $\bar{y}$, $\bar{x}$ are corresponding means form the simple random sample of size n, then their Co-variances

$$E(\bar{y}-\bar{Y})(\bar{x}-\bar{x}) = \frac{N-n}{nN} \cdot \frac{1}{N-1} \sum_{i=1}^{N} (yi - \bar{Y})(xi - \bar{x})$$

Q.No.3 (a) How to minimize (Avoid) Non-Sampling error.

(b) If variates yi, xi are measured on each unit of a simple random sample of size n, assumed large, the MSE

P T O

SECTION –II(SUBJECTIVE PORTION 80 MARKS) TIME ALLOWED 2:20

Attempt any Four (04) questions.

Q.No.2(a) Describe the procedure for testing the hypothesis about difference between two proportions base on large samples.

(b) Given the data

$$n_1 = 200, \hat{p}_1 = 0.7, \quad n_2 = 100 \quad \hat{p}_2 = 0.5$$

Find a 95 % confidence interval for $p_1 - p_2$.

Q.No.3(a) Describe Bartlett,s test for homogeneity of variance?

(b) Show that the estimates 3.8, 4.4, 8.1, 6.1 and 9.4 of the population variance, based on 5 , 8 , 6 , 7 , and 4 degree of freedom respectively, may be regarded as homogenous.

Q.No.4(a) Write the procedure for population correlation coefficient 'e' when $e = e_o$

(b) The value of r = 0.6 is calculated from a random sample of 39 pair of observation from a normal bivariate population is this value of r is consistent with the assumption $e = 0.4$?

Q.No.5(a) Explain multiple and partial correlation?

(b) Given the following data

$\sum x = 725, \sum x^2 = 44475, \sum xy = 61685, \bar{x} = 60.42, \sum y = 1011, \sum y^2 = 85905, \bar{Y} = 84.25$

n = 12, find 95 % confidence interval for β.

Q.No.6(a) Describe fisher s exact test for a 2 x 2 contingency table

(b) Suppose that a number of patients were treated for cancer with results as in the following table.

	Tumer Regression	
Toxity Present	Yes	No
Yes	5	2
No	3	7

Use fisher's exact test to test the independence.

Q.No.7(a) How do non parametric test differ from parametric test? Discuss the advantages and disadvantages of non parametric test.

(b) Checking on almond tress that were planted many years ago along a country road, a country official obtained the following arrangement of healthy 'H' and diseased 'D' Trees.

HHHHI DDD HHHHHHHHH DD HH DDDD.

Test at $\alpha = .01$ weather this arrangement may be as random.

Q.No.8 Given below are the grade point averages received by two groups of students.

Group 1	3.1, 5.3, 6.4, 4.9, 5.9, 4.3, 5.8, 7.5, 3.8, 6.2
Group 2	6.8, 5.5, 9.0, 5.6, 8.9, 6.3, 8.5, 4.6, 7.9, 5.5, 7.9

Test by the Mann – whitney U test the hypothesis that the two groups of comc form identical populations. Use a 0.05 significance level.

$$$$$$$$$$$$$$

Qno 7) Show that for the Latin Square Design with r rows, the missing observation x is estimated as $x = [r (R + C + T) - 2 G] / (r - 1) (r-2)$ where R, C and T are the total of missing Rows , Column and Treatment respectively.

Qno8) Carry out the Analysis of covariance for the data given below.

BLOCK	TREATMENT					
	A		B		C	
	X	Y	X	Y	X	Y
1	11	5	7	5	14	10
2	9	2	6	4	9	6
3	8	6	2	1	11	8
4	10	5	10	7	12	6
5	10	4	7	9	10	9

Qno 9) A 2^2 factorial experiment with 4 replicates was planned to study the effect of urea and potash on the yield of tomatoes. All the combinations of two levels of urea 0% (p_0) and 5 % (p_1) per acre and two levels of potash 0% (K_0) and 5 % (K_1) per acre were studied in an RCB design with four replications each. The following are the yields. Analyze the data and state your conclusions.

REPLICATES	TREATMENT YIELDS			
	P_0K_0 I	P_0K_1 K	P_1K_0 P	P_1K_1 PK
1	23	25	22	38
2	26	36	40	38
3	29	20	20	30
4	28	31	24	34

Co-Variance of $\hat{R} = \bar{y} / \bar{x}$ are each approximate.

$$MSE(\hat{R}) = V(\hat{R}) = \frac{(1-f)}{n\bar{x}^2} \cdot \frac{\sum_{i=1}^{N} (yi - Rxi)^2}{N-1}$$

Where. $R = \bar{Y} / \bar{x}$ and $f = \frac{n}{N}$.

Q.No.4 (a) Explain Sampling proportions and percentages.

(b) An unbiased estimate of the variance of sample proportion on P derived from the sample is

$$\hat{V}(P) = s_p^2 = \frac{N-n}{N} \cdot \frac{Pq}{n-1}$$

Q.No.5 (a) Define reasons for stratification

(b) prove that $E(s_h^2) = S_h^2$

Q.No.6 (a) i) Define Neyman Allocation ii) Define Optimum Allocation.

(b) If F.P.C is ignored them show that
$V_{opt} \leq V_{prop} \leq V_{arnd}$.
Where optimum allocation is fixed n, that is with $n_h \propto N_h S_h$

Q.No.7 (a) Explain stratified random sampling and main principles of stratification.

(b) For stratified random sampling the variance of the estimate $\bar{y}_{st}$ is

$$V(\bar{y}_{st}) = \frac{1}{N^2} \sum_{h=1}^{L} N_h (N_h - n_h) \cdot \frac{S_h^2}{n_h}$$

Where $f_h = \frac{n_h}{N_h}$

Q.No.8 (a) Define ratio sampling.

(b) The ratio estimate of the population total Y, the population mean $\bar{Y}$, and the population ratio $R = y / x$ are respectively.

$\hat{Y}_R = \bar{y} / x \cdot x$, $\hat{\bar{Y}} = \bar{y} / \bar{x} \cdot \bar{x}$ and. $\hat{R} = \bar{y} / \bar{x}$
In a simple random sample of size n (n large) then prove that.

i) $V(\hat{Y}_R) = N^2 \frac{(1-f)}{n} \left[\frac{\sum_{i=1}^{N} (yi - Rxi)^2}{N-1} \right]$

ii) $V(\hat{\bar{Y}}_R) = \frac{1-f}{n} \left[\frac{\sum_{i=1}^{N} (yi - Rxi)^2}{N-1} \right]$

iii) $V(\hat{R}) = \frac{1-f}{n\bar{x}^2} \left[\frac{\sum_{i=1}^{N} (yi - Rxi.)^2}{N-1} \right]$

Where . $f = n / N$.

Q.No.9 (a) Define Ratio Estimate.

(b) In large simple with random sampling the ratio Estimate.
$\hat{Y}_R$ has a Smaller variance then the estimate.

$\hat{Y} = N\bar{y}$ obtained by simple expansion
If $\rho > \frac{1}{2} \frac{(Sx) / \bar{x}}{(S_Y) / \bar{Y}}$

Q.No.10 Write Short note any four of the following.

1. Absolute Error
2. Probability & Non Probability sampling.
3. Principle steps in sample survey.
4. Estimation of sample size.
5. What are advantages and disadvantages of stratification.
6. Sampling USE in Daily Life.

UNIVERSITY OF BALOCHISTAN QUETTA
MA / MSc (ANNUAL) EXAMINATION .2014.

Attention:- 1- Possession & Use of mobiles & other electronic accessories are strictly prohibited . If any one possess / uses , his /her case will be sent to unfair means committee.

2- If any candidate show / Marks his / her identity in the answer book , he / she will be disqualified for the said paper .

SUBJECT: **STATISTICS** PAPER: III (Previous)

Probability and Probability Distributions

Time Allowed for this Section: **40 Minutes** Max Marks: 100

SECTION – I (Max. Marks for this Section: **20**)

Q No. 1. a) Mark True or False (Any Ten)

i. Distributions having $\beta_2 > 3$ are called leptokurtic.

ii. The median of standard uniform variate is 1.

iii. A dice is thrown, the probability of getting 2 given that an even number has occurred is 1/3.

iv. The harmonic mean H, is defined as $H = \int \frac{1}{x} f(x)\, dx$.

v. The fourth cumulant is equal to the fourth moment about mean.

vi. If $X \sim N(\mu, \sigma^2)$, then $\mu_4 = 3\sigma^4$.

vii. The Beta function, $B(3,3) = 1/5$.

viii. The F-distribution is the ratio of two Chi-square variates.

ix. The points of inflexion of the standard normal curve are ± 1.

x. The support of Chi-Square distribution is $-\infty$ to ∞.

xi. If $f(x) = 1; 0 < x < 1$, then the p.d.f. of $Y = e^X$ is $f(y) = 1/y; 1 < y < e$.

xii. The determinant of the Jacobian is always positive.

b) Fill in the blanks (Any Ten)

i. If X is a random variable and a is a constant then $M_{X+a}(t) =$ _____.

ii. The sum of two independent Poisson random variable with parameters μ_1 and μ_2 is a Poisson random variable with parameter _____.

iii. The characteristic function $\phi_Y(t) = E$_____.

iv. $\int_0^\infty \sqrt{x} e^{-x}\, dy =$ _____.

v. If Z and W are independent random variable then $f_{ZW}(z,w) =$ _____.

vi. If $M_X(t) = 1 + (t^2) + (t^2)^2 + \cdots$, then $\mu_2' =$ _____.

vii. According to Chebyshev's inequality $P(|X - \mu| < K\sigma) \geq$ _____.

viii. For large n, $P(|\bar{X} - \mu| \geq \epsilon) \rightarrow$ _____.

ix. If $Z \sim N(0,1)$, then $M_z(t) =$ _____.

x. The Central Limit Theorem states that _____.

xi. If $Z_i \sim N(0,1)$, and $Y = Z_1^2 + Z_2^2$, then $Y \sim$ _____.

xii. One of the assumptions of Students-t distribution is that _____.

UNIVERSITY OF BALOCHISTAN, QUETTA

M.A/M.Sc (ANNUAL) EXAMINATION 2014

SUBJECT: **STATISTICS** PAPER: III (Previous)

Probability and Probability Distributions

Time Allowed for this Section: **2 hrs 20 Minutes** Max. Marks for this Section: **80**

SECTION - II

NOTE: Attempt any FOUR Questions from Section – II. All questions carry equal marks.

Q. No. 2. a) If A_1 and A_2 are any two events then show that

$$P(A_1 \cup A_2) = P(A_1) + P(A_2) - P(A_1 \cap A_2)$$ (10)

b) An urn contains 5 balls. Two balls are drawn at random and are found to be white. What is the probability of all the balls being white? (10)

Q. No. 3. a) State and prove the Chebyshev's Inequality. (10)

b) The excess time customers used on their basic cell phone contract follows exponential distribution with mean of 22 minutes. Consider a random sample of 80 customers who exceed the time allowance. What is the probability that average excess time used by 80 customers in the sample is longer than 20 minutes? (10)

Q. No. 4. a) Find the moment generating function of the binomial distribution and hence find its mean and variance. (12)

b) Assume that each of your call has a probability of 0.02 of connecting, that is, of not obtaining a busy signal. Assume that your calls are independent then what is the probability that your first call that connects is your tenth call? Also find the mean number of calls needed to connect. (08)

Q. No. 5. a) Show that the median and mode of normal distribution coincide. (12)

b) Let $X \sim \text{Exp}(0.5)$. What is the probability that X exceeds 2?
Also find $P(X \geq 10 / X \geq 9)$. (08)

Q. No. 6. If X_1 and X_2 are independent uniform variates on [0, 1], find the distributions of X_1/X_2 and X_1X_2. (20)

Q. No. 7. Find the characteristic function of the chi-square distribution and using it calculate the first four cumulants of the distribution. Also find the mode of the chi-square distribution. (20)

Q. No. 8. a) Let $Z \sim \text{N}(0,1)$ and $C \sim \chi^2_n$. Derive the p.d.f of $t = Z/\sqrt{C/n}$. (10)

b) Find the r-th moment of F-distribution and hence calculate its mean. (10)

Q. No. 9. a) Write a note on order statistics. (08)

b) Show that the probability of the range of a random sample of size 4 from the uniform distribution with p.d.f. $f(y) = 1; 0 \leq y \leq 1$, is less than 0.5. (12)