

RESEARCH METHODOLOGY AND STATISTICAL METHODS

New Syllabus- 2065

Course No.: MSC 501

Nature of the Course: Core

Duration of the Course: 100 lecture hours

Duration of the Class: 60 minutes

Full Marks: 100

Pass Marks: 40

CONTENTS

Group A: Research Methodology

- Unit 1. Introduction to Research** **LH 5**
- Definition and nature of research; Concept, features and process of scientific research; Basic and applied research, Quantitative and qualitative paradigms of research; Features of social science research; Difficulties of applying scientific methods to social science research; Management research-concept, types, methodology, and value of decision making, Ethical issues in management research
- Unit 2. Preliminary Stages of Research** **LH 5**
- Literature review- sources of the literature, phases in the review, format of review presentation; Problem definition, Theoretical framework-theory, propositions, concepts, constructs, and variables; Deductive and inductive reasoning; Research questions; Hypothesis formulation; types and formats of hypothesis, features and criteria of good hypothesis.
- Unit 3. Research Design** **LH 5**
- Concepts, Classification of designs- exploratory, historical, descriptive; Case study; development, correlational, causal-comparative, survey, experimental and quasi-experimental research; Qualitative research- concept, features, assumptions and research design, Pilot study; Sources of error in research design
- Unit 4. Measurement and Scaling** **LH 5**
- Concepts and importance of measurement; Data types- nominal, ordinal, interval and ratio; attitude measurement- Concept and techniques of measurement; Construction of attitude scales; Different formats of scale construction; Attitude rating and ranking scales; Criteria of good measurement; Reliability and Validity of measurement
- Unit 5. Sampling** **LH 5**
- Concept: Sampling design; sampling process; Types of sampling- probability and non-probability, sampling size, sampling vs. non-sampling errors, methods of minimizing such errors
- Unit 6. Data Collection** **LH 8**
- Classification of primary and secondary data; Quantitative data collection; Source and use of secondary data; Sources of primary data; Questionnaire- Contents, design, and administration; Pre-testing; Research interview- Personal and telephone, interview problems, Principles of interviewing; Qualitative data collection- focus group, depth interview, participative method; Observation- participant and non-participant; Designing and conducting an observational study, Use of internet for data collection, Factors affecting choice of data collection methods.
- Unit 7. Data Analysis** **LH 8**
- Preparing and presenting data- editing, coding, classification and tabulating; summarizing data- tables, graphs and charts; Statistical analysis- descriptive analysis, inferential analysis, parametric and non-parametric analysis; Analysis of qualitative data- content, thematic and narrative analysis.
- Unit 8. Topic Selection and Research Proposal** **LH 5**
- Topic selection- sources, factors to be considered for topic selection; Purposes of research proposal; Types-solicited and unsolicited; Structuring the research proposal- contents and formats, proposals for funded research; Criteria of evaluating the research proposal

Unit 9. Research Report

LH 4

Presentation of a research report; Types of report; Formats and components of research report- preliminaries, body of the report, supplementary section; Styles of report writing; Styles and uses of citations and references.

Group B: Statistical Methods**Unit 1. Probability**

LH 10

Concept and importance of probability; Types of events; Approaches to probability; Theorems of probability; Conditional probability; Baye's theorem and mathematical expectation

Unit 2. Theoretical Frequency Distribution

LH 5

Concept of theoretical distribution; binomial, Poisson and normal distributions; Fitting binomial and Poisson distribution

Unit 3. Sampling

LH 5

Meaning and objective of sampling; Types of universe; Concept of sampling techniques and census method; Sampling distribution; Standard error and its utility in testing of hypothesis

Unit 4. Estimation

LH 5

Estimation and estimators; Criteria of a good estimator; Types of estimates; Point and interval estimate; Relationship among the errors; risk and the sample size; Estimation of sample size

Unit 5. Testing of Hypothesis

LH 15

Meaning of hypothesis; Types of errors in testing of hypothesis; Level of significance; Critical region; One tailed and two tailed tests; Parametric and non-parametric tests; Parametric test for variable and attribute; Large sample test; Test of significance of mean, proportion, difference of means and proportions; Small sample test: Student's t-test - Test of significance of mean and difference of means, paired t-test, test of significance of an observed samples; Correlation coefficient; Variance-ratio test: F-test. Analysis of variance: one way and two way classification; Non-parametric test: Chi-square test for goodness of fit and independence, Chi-square test for the population variance

Unit 6. Correlation and Regression Analysis

LH 10

Multiple and partial correlation; Coefficient of multiple determination, Multiple regression equation; Test of regression coefficient of Multiple regression model, Standard error of estimate for multiple regression, Auto correlation: Durbin-Waston test statistic; Multicollinearity.

Basic References

- Cooper, Donald R. and Schindler, P.S. (2003). **Business Research Methods** (8th Edition). New Delhi: Tata McGraw-Hill.
- Kerlinger, F.N. (1978). **Foundation of Behaviour Research**. New Delhi: Surjeet Publication.
- Levin, R.I. and David SR. (1991). **Statistics for Management**. New Delhi: Prentice Hall of India.
- Wolff, H.K. and Pant, P.R. (2002). **Social Science Research and Thesis Writing**. (3rd Edition). Kathmandu: Buddha Academic Enterprises.
- Zikmund, W.G. (1994). **Business Research Methods** (4th Edition). Thomson South-Western, New York: The Dryden Press.

Supplementary Readings

- Chandan, J. (2001). **Statistics for Business and Economics**. New Delhi: Vikash Publishing House Pvt. Ltd.
- Gupta, S.C. (2002). **Fundamentals of Statistics**. Mumbai: Himalayan Publishing House.
- Michael, V.P. (2000). **Research Methodology in Management**. Mumbai: Himalayan Publishing House.
- Pokharel, B. (2003). **Research Methodology in Management**. Kathmandu: New Hira Books Enterprises.
- Saravanel, P (2001). **Research Methodology**. Allahabad: Kitab Mahal.
- Sauders, M., Lewis, P. and Thornhill, A. (2003). **Research Methods for Business**

Students. New Delhi: Pearson Education.

Sharma, P.K. and Chaudhary, AK. (2064). **Statistical Methods.** Kathmandu: Khanal Publication Pvt. Ltd.

Shrestha, S. and Silwal, D.P. (2063). **Statistical Methods in Management.** Kathmandu: Taleju Prakashan.

Silwal, D.P. (2062). **Research Methods in Management.** Kathmandu: Taleju Prakashan.

Sthapit, A.B., Gautam, H. Joshi, P.R. and Dongol, P. (2009). **Statistical Methods.** Kathmandu: Buddha Academic Enterprises.

Yadav, R., Dhakal, B., Tamang, G., Panta, K. and Shrestha, H. (ND). **Statistical Methods.** Kathmandu: Asmita Publishing House.

New Model Questions- 2066

Time: 4hrs.

Full Marks: 100

Answer any FIVE questions for each group. All the questions carry equal value.

Group A: Research Methodology

- Describe the characteristics of Scientific Research.
- What is the importance of literature review in research? Describe how the literature survey should be organized.
- Differentiate between research question and research hypothesis. What is the importance of research problem?
- What is a research design? Describe various types of research designs.
- What are various scales of measurement of data? Discuss the importance of reliability and validity in measurement.
- What is a research report? Describe the general format of a research report.

Group B: Statistical Methods

- In a survey of 1,500 customers who did holiday shopping on live. 18% indicated that they were not satisfied with their experience of the customers that were not satisfied. 53% indicated that they did not receive their product in time for the holidays. The complete set of results is as follows:

	Received product in time			Total
	Yes	No		
Satisfied with experience	Yes	1197	33	1230
	No	127	143	270
	Total	1324	176	1500

- Given that the customer was satisfied with the experience, what is the probability that he or she did not receive their product in time for holidays?
 - If the customer received the product in time for the holidays, what is the probability that he or she was satisfied with their experience?
- Ans: (a) 0.97 (b) 0.90
- On a very long mathematics test. Ram got 70% of the items right. For a 10 item quiz, calculate the probability that Ram will get
 - at least 8 items right
 - less than 3 items right.

Ans: (i) 0.3828 (ii) 0.0016

 - Plastic bags used for packaging produce are manufactured so that the breaking strength of the bag is normally distributed with a mean of 5 pounds per square inch and a standard deviation of 1.5 pounds per square inch. What proportion of the bags produced have a breaking strength of
 - at least 3.6 pounds per square inch?
 - between 3.6 and 5.2 pounds per square inch?

Ans: (i) 0.8238 (ii) 0.3755

- The operations manager at a light bulb factory wants to determine whether there is any difference in the average life expectancy of bulbs manufactured on two different types of machines. The population standard deviation of machine I is 110 hours and that of machine II is 125 hours. A random sample of 25 light bulbs obtained from

machine I indicates a sample mean of 375 hours and a similar sample of 25 from machine II indicates sample mean of 362 hours.

Using 5% level of significance, is there any evidence of a difference in the average life of bulbs produced by the two types of machines?

Ans: $Z = 0.39$; accept H_0

- b. Three different training methodology were compared to see if the productivity is improved after training. Following information and the result were observed. At 5% level of significance, set up the hypothesis, test the hypothesis and discuss the decision.

One-way ANOVA Table

Source of variation	d.f.	Sum of squares
Between samples	$3 - 1 = 2$	108
Within samples		514
Total	$18 - 1 = 17$	622

Ans: $F = 1.58$; accept H_0

10. A newspaper publisher, trying to pinpoint his market's characteristics, wondered whether newspaper readership in the community is related to reader's educational achievement. A survey questioned adults in the area on their level of education and their frequency of readership. The results are shown as below:

Frequency of Readership	Level of Educational Achievement				Total
	Post Graduate	College Graduate	High School	Not complete High School	
Never	10	17	11	21	59
Sometimes	12	23	8	5	48
Morning or Evening	35	38	16	7	96
Both Editions	28	19	6	13	66
Total	85	97	41	46	269

At 5% level of significance, does the frequency of newspaper readership in the community differ according to the reader's level of education?

Ans: $\chi^2 = 32.9045$; reject H_0

11. A mail-order catalog business selling electronic items maintains centralized warehouse. Management is currently examining the process of distribution from the warehouse and wants to study the factors that affect warehouse distribution cost. The sales and number of orders received are observed as major independent variables affecting distribution cost. Data collected over last 10 months is as follows:

Year	Distribution cost (Rs. 1,000)	Sales (Rs. 1,000)	No. of orders
1	2	1	50
2	3	4	60
3	4	5	40
4	2	3	80
5	3	7	90
6	4	8	70
7	4	9	80
8	5	11	100
9	6	12	120
10	7	20	110
Total	40	80	800

- (a) Estimate multiple regression equations.
 (b) Also estimate the coefficient of determination, and obtain the distribution cost, if sales is Rs. 25 and number of orders is 150.

Ans: (a) $Y = \text{Distribution cost (Rs. 1,000)}$; $X_1 = \text{Sales (Rs. 1,000)}$; $X_2 = \text{No. of order}$;

$\hat{Y} = 2.08 + 0.305X_1 - 0.0085X_2$ (b) 0.8954; Rs. 8,730

12. Write short notes on any TWO:

- (a) Sample size determination (b) Auto correlation (c) Criteria of a good estimator.

Group A: RESEARCH METHODOLOGY**1. INTRODUCTION TO RESEARCH**

1. 2071 Q.No. 1
Discuss various types of research that can be applied in the field of management with suitable examples. [10]
2. 2070 Old Q.No. 1
What is the role of research in management? Explain various types of research. [10]
3. 2069 Q.No. 1
Differentiate between basic and applied research. Describe the process of scientific research. [10]
4. 2069 Old Q.No. 1
What do you understand by "Scientific Research Process"? Explain various steps involved in scientific research process. [10]
5. 2068 Q.No. 1
What is scientific research? Explain the roles of research in management. [10]
6. 2068 (Old) Q.No. 1
What is scientific research? Explain the roles and application of research in management. [10]
7. 2067 (I) Q.No. 1
What is the importance of research in management studies? Describe the difficulties in application of scientific methods in management research. [10]
8. 2067 (II) Q.No. 1
Differentiate between policy research and managerial research with suitable examples. [10]
9. 2067 (II) (Old) Q.No. 1
What is 'Scientific Research Process'? Explain the role of scientific research in management. [10]
10. 2066 Q.No. 1
What is scientific research? Discuss its characteristics. [10]
11. 2066 Partial Q.No. 1
What is historical research and what are its characteristics? [10]
12. 2065 (I) Q.No. 6
Discuss various types of research. Also explain the scope and objective of research. [10]
13. 2064 Q.No. 3
What is scientific research? Explain the steps of scientific research methods. [10]
14. 2063 Q.No. 1
What is scientific research? Explain the roles of research in management. [10]
15. 2061 Q.No. 1
What is scientific method of research? Discuss various steps of scientific method. [10]
16. 2059 Q.No. 1
What is the role of research in management? Explain various types of research. [10]
17. 2058 Q.No. 1
What do you understand by 'scientific research process'? Explain various steps involved in the scientific research process. [10]
18. 2057 (I) Q.No. 1
What is scientific research? Explain the role of research in management. [10]

2. PRELIMINARY STAGES OF RESEARCH

1. 2071 Q.No. 2
What is bibliography? Explain the importance of bibliographic representation in review of literature in research. [10]

2. 2070 Q.No. 1

What is research hypothesis? Explain the problems involved in formulating research hypothesis. [10]

3. 2070 Q.No. 2

State and explain the importance of 'Review of Literature' in a management research work. [10]

4. 2070 Old Q.No. 2

What are the characteristics of a good research hypothesis? Is it necessary to formulate research hypothesis in every research study? [10]

5. 2070 Old Q.No. 3

What is the importance of 'Review of Literature' in research work? Explain how library findings are organized for research purpose. [10]

6. 2069 Q.No. 2

What is a research hypothesis? Discuss the types of hypothesis and their formulation. [10]

7. 2069 Q.No. 3

State and explain the importance of literature review in management research. Describe the sources of the literature and the format of review presentation of a textbook and a journal. [10]

8. 2069 Old Q.No. 2

What is review of literature? Explain "bibliography" and its importance in review of literature during research process. [10]

9. 2069 Old Q.No. 6

What is research hypothesis? Explain the important characteristics of a good research hypothesis. [10]

10. 2068 Q.No. 2

What is review of literature? Discuss why it is necessary in a research work. [10]

11. 2068 (Old) Q.No. 2

What is review of literature? Discuss the importance of review of literature in research work. [10]

12. 2067 (I) Q.No. 2

What is the difference between deductive and inductive reasoning in research? Explain the research problem, research question and research hypothesis. [10]

13. 2067 (I) Q.No. 3

What is the importance of literature review in management research? Describe various formats of review presentations. [10]

14. 2067 (II) Q.No. 2

What is a research question? How does it help in formulating research hypothesis? [10]

15. 2067 (II) Q.No. 5

Explain the need and importance of 'Review of Literature' in a management research. Describe various sources of literature. [10]

16. 2067 (II) (Old) Q.No. 2

What is review of literature and explain its importance in research? [10]

17. 2067 (II) (Old) Q.No. 5

What is research hypothesis? What are the characteristics of a good research hypothesis and also explain the procedure of hypothesis formulation. [10]

18. 2066 Q.No. 3

What is review of literature? Discuss why it is necessary for a research work. [10]

19. 2065 (I) Q.No. 1

Describe the techniques of composing bibliography and footnotes while reviewing the literature. [10]

20. 2065 (II) Q.No. 4

What do you understand by 'Review of Literature'? What purpose does it fulfill in research work? [10]

21. 2064 Q.No. 1

What is research hypothesis? Explain with suitable examples, the formulation of hypothesis. [10]

22. 2064 Q.No. 2

What do you understand by 'Review of Literature'? Discuss the importance of literature review in research. [10]

23. 2063 Q.No. 3

What is review of literature? What purpose does it fulfill in research work? [10]

24. 2062 Q.No. 2

What is the importance of 'Review of Literature' in a research work? Explain how library findings are organized for research purpose. [10]

25. 2061 Q.No. 2

What is bibliography? Explain the importance of bibliographic representation in review of literature during research process? [10]

26. 2061 Q.No. 6

What is research hypothesis? Explain important characteristics of a good research hypothesis. [10]

27. 2060 Q.No. 2

What is hypothesis? What are the characteristics of a good research hypothesis? Is it necessary to formulate hypothesis in every research study? [10]

28. 2060 Q.No. 4

What is 'Review of Literature'? Explain important aspects of review of literature in a research. [10]

29. 2059 Q.No. 4

What is research hypothesis? Explain the types of errors that can be committed while testing hypothesis. Illustrate with examples. [10]

30. 2058 Q.No. 2

State and explain the importance of 'Review of Literature' in a research work. [10]

31. 2057 (I) Q.No. 4

Explain why is necessary to review literature in any type of research work. [10]

32. 2057 (II) Q.No. 1

What is hypothesis? What problems are involved in formulating research hypothesis? [10]

33. 2057 (II) Q.No. 3

What is review of literature? What purpose does it fulfill in research work? [10]

3. RESEARCH DESIGN**1. 2071 Q.No. 5**

What is research design? Describe different types of research design used in the field of management? [10]

2. 2070 Q.No. 3

What is research design? Explain the factors that should be considered in selecting appropriate research design. [10]

3. 2070 Old Q.No. 5

What are various types of research design? Explain the common sources of error in research design. [10]

4. 2069 Q.No. 4

Describe various types of research design applicable in management research. Illustrate each of them with suitable example. [10]

5. 2069 Old Q.No. 4

What is research design? Explain the considerations that should be made in selecting appropriate research design. [10]

6. 2068 Q.No. 3

What is research design? Describe the types of research design used in the field of management. [10]

7. 2068 (Old) Q.No. 4

What is research design? Describe different types of research design used in the field of management. [10]

8. 2067 (I) Q.No. 4

What is a research design? Describe basic features of qualitative research design with suitable example. [10]

9. 2067 (II) Q.No. 3

What is quasi experimental research design? What are its characteristics? Give example of the situation under which you adopt this method. [10]

10. 2067 (II) (Old) Q.No. 3

What is research design? Discuss various type of research design.

11. 2066 Q.No. 2

What is research design? Explain the elements of a research design. [10]

12. 2066 Partial Q.No. 3

What is case study and how this method helps in research works? Explain. [10]

13. 2065 (I) Q.No. 5

What are various types of research design? Explain the common sources of error in research design. [10]

14. 2065 (II) Q.No. 5

State and explain different types of research design. [10]

15. 2064 Q.No. 6

What is research design? Explain various types of research design. [10]

16. 2063 Q.No. 5

What is research design? What consideration should be made to select appropriate research design? [10]

17. 2062 Q.No. 3

What is 'Research Design'? Describe various types of research design. [10]

18. 2061 Q.No. 3

What is research design? Discuss different types of research design. [10]

19. 2060 Q.No. 6

What is research design? Explain various types of research design. [10]

20. 2059 Q.No. 5

Describe the types of research design used in management areas. [10]

21. 2058 Q.No. 3

You are 'principal researcher' in a research project, entitled 'socio-economic impact of Visit Nepal 98'. State with reasons, which research design would you adopt. [10]

22. 2057 (I) Q.No. 3

What is research design? What considerations should be made to select appropriate research design? [10]

23. 2057 (II) Q.No. 4

What is action research? What are the factors that should be considered in conducting action research? [10]

4. MEASUREMENT AND SCALING**1. 2071 Q.No. 3**

Define the terms 'reliability and validity'. Discuss its importance in measurements of data. [10]

2. 2070 Q.No. 4

What is measurement scaling? Differentiate between nominal and ordinal scale of measurements. [10]

3. 2069 Q.No. 5

Discuss how reliability and validity are important in the measurement of attitude in scale. [10]

4. 2069 Old Q.No. 3

Define terms reliability and validity". Discuss its importance in measurement of data. [10]

5. 2067 (I) Q.No. 4

What is ordinal scale? What statistical techniques can be used to analyse with an ordinal scale data? [10]

6. 2066 Q.No. 4

Define the terms 'reliability and validity'. Discuss its importance in measurement of data. [10]

7. 2059 Q.No. 2

What are the types of data measurement? Explain the Likert-scale as a measurement of attitude scale. [10]

5. SAMPLING**1. 2071 Q.No. 4**

Explain various types of sampling techniques with suitable examples. [10]

2. 2070 Q.No. 5

What is sampling technique? Describe various sampling techniques with suitable examples. [10]

3. 2068 (Old) Q.No. 6

What is sampling? Discuss various sampling techniques. [10]

4. 2065 (I) Q.No. 2

Explain various types of sampling techniques with suitable examples. [10]

5. 2062 Q.No. 6

What are various sampling techniques in selecting sample for data collection? [10]

6. 2060 Q.No. 3

What is the importance of sampling technique? Discuss various sampling techniques. [10]

6. DATA COLLECTION**1. 2070 Old Q.No. 4**

Explain how questionnaire is prepared? Discuss various techniques of questionnaire method of data collection. [10]

2. 2069 Q.No. 6

Explain the qualitative data collection methods. Discuss the factors affecting choice of data collection methods. [10]

3. 2069 Old Q.No. 5

What do you understand by data collection? Explain the factors affecting the selection of the methods of data collection. [10]

4. 2068 Q.No. 4

What is questionnaire? Describe the nature and quality of a good questionnaire. [10]

5. 2068 (Old) Q.No. 3

What do you understand by questionnaire? Differentiate between structured and semi-structured questionnaire. [10]

6. 2067 (I) Q.No. 5

What is a questionnaire? Discuss the limitations in questionnaire design. [10]

7. 2067 (II) (Old) Q.No. 4

Explain how questionnaire should be prepared? Discuss various techniques of questionnaire method of data collection.

8. 2066 Q.No. 6

What is questionnaire method of data collection? Why pre-test is necessary for conducting

questionnaire method of data collection? Explain.

[10]

9. 2066 Partial Q.No. 2

What are the major components of a questionnaire? Explain with examples.

[10]

10. 2065 (I) Q.No. 3

Discuss the method of secondary data collection. Also explain with example the 'focus-group discussion' as a method of primary data collection.

[10]

11. 2065 (II) Q.No. 3

What is research questionnaire? Explain the construction methods of good questionnaire. [10]

12. 2065 (II) Q.No. 6

What is primary data? Explain different techniques of collecting primary data.

[10]

13. 2064 Q.No. 5

Explain the primary and secondary data collection methods for research.

[10]

14. 2063 Q.No. 2

Compare and contrast questionnaire and interview techniques of collecting data. Which technique is more reliable and why?

[10]

15. 2062 Q.No. 4

Describe the 'questionnaire method' of data collection. Discuss basic rules of questionnaire construction.

[10]

16. 2061 Q.No. 4

Describe the questionnaire as data collection technique and discuss the construction of questionnaire.

[10]

17. 2059 Q.No. 3

State and explain in brief various methods of primary data collection.

[10]

18. 2058 Q.No. 4

Describe main considerations you need to make while designing a good questionnaire.

[10]

19. 2057 (I) Q.No. 2

Discuss the advantages and disadvantages of interview techniques and mail questionnaire method of data collection.

[10]

20. 2057 (II) Q.No. 2

What is primary data? Explain different techniques of collecting primary data in brief.

[10]

7. DATA ANALYSIS

1. 2058 Q.No. 5

Explain the 'content analysis' with suitable examples. Also explain in brief the need of coding of data.

[10]

8. TOPIC SELECTION AND RESEARCH PROPOSAL

1. 2068 Q.No. 5

What is research problem? Explain how research problems are identified.

[10]

2. 2066 Partial Q.No. 4

What is research problem? Discuss the quality of a good research problem with appropriate examples.

[10]

3. 2066 Partial Q.No. 5

What is research proposal and what are the major steps involves in preparing a research proposal?

[10]

4. 2065 (II) Q.No. 1

What is research problem? Discuss basic characteristics of a good research problem with suitable illustrations.

[10]

5. 2063 Q.No. 6

Explain how research proposals should be prepared and presented?

[10]

6. 2062 Q.No. 1

What is research problem? How a research problem be presented in terms of research hypothesis? Discuss in brief. [10]

7. 2060 Q.No. 5

Explain how research proposals should be prepared and presented. [10]

8. 2059 Q.No. 6

Explain the basic guidelines for preparation of a "research proposal." [10]

9. 2057 (I) Q.No. 5

What is research problem? Explain how research problems are identified? [10]

10. 2057 (II) Q.No. 5

Explain how research proposals should be prepared and presented? [10]

9. RESEARCH REPORT**1. 2071 Q.No. 6**

What is research report? Explain how research report is prepared and presented. [10]

2. 2070 Q.No. 6

What is research report? Explain the procedures of writing research report. [10]

3. 2070 Old Q.No. 6

Describe the format of a research report giving suitable illustrations. [10]

4. 2068 Q.No. 6

What is research report? Describe the format of a research report with suitable illustrations. [10]

5. 2068 (Old) Q.No. 5

What is research report? Explain various steps of writing research report. [10]

6. 2067 (I) Q.No. 6

Describe various aspects of the research report in management research. Discuss with a practical example. [10]

7. 2067 (II) Q.No. 6

What is thesis? What are the steps in thesis writing? [10]

8. 2067 (II) (Old) Q.No. 6

What is research report? Explain the procedure of preparing and presenting research report.

9. 2066 Q.No. 5

What are the basic differences between a thesis and a project work? Explain the methods of a project work. [10]

10. 2066 Partial Q.No. 6

Explain various steps that involves in thesis writing also explain in brief about the problems that may occur while writing a thesis. [10]

11. 2065 (I) Q.No. 4

Describe the research report writing procedures. [10]

12. 2065 (II) Q.No. 2

What is research report? Explain various steps required to prepare a final research report. [10]

13. 2064 Q.No. 4

Describe the various steps in a research report. [10]

14. 2063 Q.No. 4

What is research report? Explain various steps required to prepare a final research report. [10]

15. 2062 Q.No. 5

What is a 'Research Report'? Explain the steps of writing a research report. [10]

16. 2061 Q.No. 5

What is research report? Explain the steps to be followed in preparing a research report? [10]

17. 2060 Q.No. 1

What is research report? Explain how research reports should be prepared and presented. [10]

18. 2058 Q.No. 6

Describe the format of a research report giving suitable illustration. [10]

19. 2057 (I) Q.No. 6

Explain various steps of writing research report. [10]

20. 2057 (II) Q.No. 6

What is research report? Explain the procedures of writing research report. [10]

Group B: STATISTICAL METHODS

1. PROBABILITY

A. BASIC PROBABILITY

MBS

THEORETICAL QUESTIONS

1. 2057 (I) Q.No. 7 b

Explain the theorems of probability with suitable examples. [5]

NUMERICAL PROBLEMS

2. 2071 Q.No. 7a

In a class of MBM there are 30 boys and 20 girls. Two students have to be selected as class representatives. What is the probability that selected representative consists of ① one boy and one girl ② no girl. [5]

Ans: (1) 0.4898 (2) 0.3551

3. 2070 Q.No. 7a

A product is made up of three components C_1 , C_2 and C_3 . The probability that these components are defective are in the ratio 1 : 2 : 3. Find the probability that one product selected at random is non-defective. [5]

Ans: 0.28

4. 2070 Old Q.No. 7a

In a factory there are two machines X and Y. Machine X works without failure 90% of time and machine Y works without failure 80% of time. Find the probability that ① at least one machine will work without failure ② only one machine will work without failure. [5]

Ans: ① 0.98 ② 0.26

5. 2069 Q.No. 7

A team of 4 students are needed to form in a student publication in a campus. The students are selected from management and marketing specialisation group. There are 15 students in each specialisation group.

- ① What is the probability that all are from management group?
- ② What is the probability that all from marketing group?
- ③ What is the probability that 2 students are from management and 2 are from marketing group? [10]

Ans: ① 0.0498 ② 0.0498 ③ 0.4023

6. 2069 Old Q.No. 7a

An article manufactured by a company consists of two parts X and Y. In the process of manufacture of part x, 7 out of 100 are likely to be defective, similarly 5 out of 100 are likely to be defective in the manufacture of part Y. Calculate the probability that the article will ① be defective ② not be defective. [5]

Ans: ① 0.1165 ② 0.8835

7. 2068 Q.No. 7a

The probability of three students solving a problem of statistics are in the ratio 2:3:4. Find the probability that the given problem will be solved. [5]

Ans: $173/243 = 0.641$

8. 2068 Q.No. 7b

A committee of three members is formed out of 5 Statisticians, 7 Engineers and 6 Economist. Find the probability that the committee (i) consists one of each kind (ii) at least one Statistician is included. [5]

Ans: (i) 0.257 (ii) 0.65

9. 2067 (II) (Old) Q.No. 7a

Two vacancies exist at senior executive level of a company. Fifteen people six women and nine men are eligible and equally qualified. The company has decided to draw two names at random from the list of eligible.

What is the probability that:

- (i) both positions will be filled by women?
 (ii) at least one position will filled by women?

[5]

Ans: (i) 0.143; (ii) 0.657

10. 2066 Q.No. 7

In a survey of 1,000 customers about the quality and timely deliverance of "The Momo World" Marketed by a company following information prevailed:

Quality satisfaction	Timely deliverance		
	Yes	No	Total
Yes	500	225	725
No	200	75	275
Total	700	300	1000

- a. What is the probability that a customer satisfied with quality but timely not delivered?
 b. What is the probability that a customer timely delivered but not satisfied with quality?
 c. What is the probability that a customer timely delivered and satisfied with quality? [10]

Ans: (a) 0.75 (b) 0.727 (c) 0.5

11. 2066 Partial Q.No. 7b

A, B and C will pass a certain examination are in proportion 2:4:6. What is the probability that at least two of them will pass the examination? [5]

Ans: 0.25

12. 2065 (I) Q.No. 7 a

If the probability of machines P, Q and R working without failure are 0.2, 0.3 and 0.5 respectively, find the probability that at least 2 machines will work without failure. [5]

Ans: 0.25

13. 2065 (II) Q.No. 7 a

A manager of a firm finds that 25% of the firm's employees are supervisors and 40% are college graduates. He also finds that 10% are both supervisors and college graduates. An employee of the firm is chosen at random. What is the probability that the employee chosen is (i) neither a supervisor nor a college graduate (ii) either a supervisor or a college graduate? [5]

Ans: (i) 0.45 (ii) 0.55

14. 2065 (II) Q.No. 7 b

In a company out of 40 people i.e. 25 men and 15 women apply for two vacancies, what is the probability that (i) both men are selected (ii) one man and one woman are selected. [5]

Ans: (i) 0.385 (ii) 0.481

15. 2064 Q.No. 7 a

In a class of MBS, there are 20 boys and 30 girls. Two students have to be selected as class representatives. What is the probability that both are boys? [5]

Ans: 38/245

16. 2061 Q.No. 12 a

A box contains 5 red and 7 white balls. Two balls are drawn at random. What is the probability that both are white? [5]

Ans: 21/66

17. 2060 Q.No. 7 a

In a group of equal number of men and women, 20% of men and 30% of women are unemployed. If a person selected is random, what is the probability that the selected person is an employed? [5]

Ans: 0.75

18. 2059 Q.No. 7 b

In a MBS first year class, there are three sections each including 20 students. In first section there are 10 boys and 10 girls, in second section there are 15 boys and 5 girls and, in the third section there are 10 boys and 8 girls. Five students are selected from each group to form a committee of 15 students. What is the probability that all the 15 students selected are girls? [5]

Ans: 3.79×10^{-9}

MBA

1. 2056 Q.No. 1 a

In a company, out of 20 candidates 14 men and 6 women apply for two vacancies. What is the probability that:

- both men are selected?
- both women are selected?
- one man and one woman are selected

[5]
Ans: (i) $\frac{91}{190}$ (ii) $\frac{15}{190}$ (iii) $\frac{42}{95}$

2. 2055 Q.No. 1 a

A manager has two assistances and he bases his decision on information supplied independently by each of them. The probability that he makes a mistake in his thinking is 0.005. The probability that an assistant gives wrong information is 0.3. Assume that the mistakes made by the manager are independent of the information given by the assistants. Find the probability that he reaches a wrong decision. [10]

Ans: 0.51245

3. 2053 Q.No. 1 b

One bag contains 7 white and 5 red balls and the other bag contains 6 white and 8 red balls. If one ball is drawn from each bag, find the probability that (i) both are white (ii) both are red (iii) one white and one red. [10]

Ans: (i) $\frac{1}{4}$ (ii) $\frac{5}{21}$ (iii) $\frac{43}{84}$

4. 2050 Q.No. 1 a

A speaks the truth in 70 percent cases and B in 85 percent of cases. In what percentage of cases are they likely to contradict and do not contradict each other in stating the same fact? [10]

Ans: 36%, 64%

5. 2048 Q.No. 1 a

The odds against A solving a problem are 8 to 6 and the odds in favour of B solving the same problem are 14 to 10. What is the probability that: (i) Both A and B will solve it, (ii) A solves it but B fails to solve it. [10]

Ans: (i) $\frac{1}{4}$ (ii) $\frac{5}{28}$

6. 2046 Q.No. 1 a

It is 8:5 against a husband who is now 55 years old living till he is 75 and 4:3 against his wife who is now 48 living till she is 68. Find the probability that: (i) The couple will be alive 20 years hence. (ii) At least one of them will be alive 20 years hence. [10]

Ans: (i) $\frac{15}{91}$ (ii) $\frac{99}{91}$

7. 2042 Q.No. 1 b

In a group of equal number of men and women 10 percent men and 45 percent women are unemployed. What is the probability that a person selected at random is employed? [10]

Ans: 0.725

8. 2039 Q.No. 5 a

A salesman carries two products, fruits and vegetables. He estimates that when he makes a call 35 percent of the time he will sell fruits and 50 percent of the time he will sell vegetables. He knows that sales of the two products are independent.

(i) What is the probability that he will sell both fruits and vegetables on the same call?

(ii) What is the probability that he will sell fruits or vegetables but not both?

[10]

Ans: (i) 0.175 (ii) 0.85

B. CONDITIONAL PROBABILITY**MBS**

1. 2071 Q.No. 7b

There are three machines M_1 , M_2 and M_3 producing 2,000; 4,000 and 6,000 articles per hour respectively. These machines are likely to produce 2%, 3% and 5% defective articles respectively. One article is selected at random from an hour production of all the three machines and is found to be defective. What is the probability that the article is produced from machine M_2 ?

[5]

Ans: 0.2609

2. 2070 Q.No. 7b

The proportion of male and female in Kathmandu city is same but their employment situation is different. 40% males and 25% females are employed, if a person is selected at random. What is the probability that the selected person is employed given that the person is ① male ② female?

[5]

Ans: ① 0.40 ② 0.25

3. 2070 Old Q.No. 7b

A, B and C are three major political parties of the county and the probability that new constitution will be introduced in stipulated time if party A leads the government is 0.4 and that of B and C are respectively 0.5 and 0.6. The probability that party A, B and C will lead the government is 0.3, 0.4 and 0.3 respectively. What is the probability that new constitution will be introduced in stipulated time?

[5]

Ans: 0.50

4. 2068 (Old) Q.No. 8a

Three machines A, B and C produce respectively 50%, 30% and 20% of total number of items of a factory. The percentages of defective output of these machines are respectively 3%, 4% and 5%. If an item selected at random, is found to be defective, what is the probability that it was produced by machine A?

[5]

Ans: 0.4054

5. 2067 (I) Q.No. 7a

In a garment factory, there are three machines producing 1,000; 2,000 and 3,000 readymade products in a batch in a day. These machines have past record of producing 1%, 2% and 1% defective items respectively; one ready item is selected from the whole day production of the factory, and is found to be defective. What is the probability that the defective item came from second machine?

[5]

Ans: 0.5

6. 2067 (II) Q.No. 7

- a. A box contains 4 red and 3 blue balls. Two drawing of 2 balls are made; find the chance that the first drawing gives 2 red and second drawing gives 2 blue balls if the balls are not returned to the box after the first draw.
- b. A box contains 3 black and 5 white balls. Another box contains 3 white and 5 black balls. A box is chosen at random and a ball is drawn, what is the probability that the ball drawn is white?

[10]

Ans: (a) 0.0857 (b) 0.50

7. 2067 (II) (Old) Q.No. 7b

Three machines X, Y and Z produce respectively 50%, 20% and 30% of the total number of items of a factory. The percentages of defective output of these machines are respectively 3%, 4% and 5%. If an item is selected at

① Find the probability that it is defective.

② If the item is defective find the probability that it is produced by machine Z. [5]

Ans: (i) 0.038 (ii) 0.395

8. 2066 Partial Q.No. 7a

A, B and C are three major political parties of the country and the probability that new constitution will be introduced in stipulated time if party A leads the government is 0.4 that of B and C are respectively 0.6 and 0.5. The probability that party A, B and C will lead the government is 0.3, 0.3 and 0.4. What is the probability that new constitution will be introduced in stipulated time? [5]

Ans: 0.5

9. 2063 Q.No. 7 a

The probability that a management trainee will remain with the company is 0.6 and the probability that the trainee will earn more than Rs. 5,000 per year is 0.2. The probability that an employee is a management trainee who remained with the company or who earned more than Rs. 5,000 per year is 0.5. What is the probability that an employee earned more than 5,000 per year given that he remained with the company? [5]

Ans: 0.5

10. 2062 Q.No. 7

An 'employment agency' in its survey report observed that male and female in a city are in equal numbers. Among them, 20% of males and 5% of females are observed to be unemployed. If a person is selected at random, what is the probability that the selected person is unemployed: (a) male; (b) female? [10]

Ans: (a) $\frac{4}{5}$ (b) $\frac{1}{5}$

11. 2061 Q.No. 7

In a factory producing portable radio, there are three machines producing 1000, 2000 and 3000 radio per hour respectively. These machines produce 1%, 2% and 1% defectives respectively. One radio is selected at random from an hour production of the three machines and found to be defective. What is the probability that this radio is produced from first machine? [10]

Ans: 0.125 [10]

12. 2060 Q.No. 8 a

A factory has two machines A and B. Machine A produces 60% of the total output and B produces 40% of the total output. Further 8% of output of machine A and 6% of output of machine are likely to be defective. If an output selected at random is defective. What is the probability that it was produced from machine B? [5]

Ans: 0.33 [5]

13. 2059 Q.No. 12 b

Project	Sales in 000' Rs.	Prob.	Cost in 000' Rs.	Prob.
1	12	0.2	6	0.3
2	15	0.3	12	0.2
3	20	0.6	8	0.4
4	28	0.4	15	0.1
5	30	0.5	20	0.7

Which project would you select and why?

Ans: Project 4, because of maximum profit. [5]

14. 2058 Q.No. 7

There are three machines A, B and C producing 1000, 2000 and 3000 articles per hour respectively. These machines are known to be producing 1%, 2% and 3% defectives respectively. One article is selected at random from an hour production of the three machines and found to be defective. What is the probability that the article is produced from: (a) machine A, (b) machine B, (c) machine C? Ans: (a) 0.07142 (b) 0.28571 (c) 0.64285 [10]

15. 2057 (I) Q.No. 7 a

The following information was obtained concerning 1000 employees of an industrial concern:

Department	Sex		
	Male	Female	Total
Manufacturing	280	220	500
Production control	175	125	300
Quality control	115	85	200
Total	570	430	1000

If an employee is chosen at random, what is the probability that

- (a) Employee chosen is male given that he belongs to production control department.
 (b) Employee chosen is female from manufacturing department.

Ans: (a) 0.583 (b) 0.44 [5]

16. 2057 (II) Q.No. 7 b

Find the expected sales of Toyota car in Kathmandu City in a week from the following information:

Days	Sun	Mon	Tue	Wed	Thu	Fri
Sales	90	60	90	50	75	55
Probability	0.25	0.18	0.12	0.05	0.20	0.20

Ans: 72.6 [5]

MBA**1. 2054 Q.No. 1 a**

Two sets of candidates are competing for the position on the Board of Directors of a company. The probabilities that the first and second sets will win are 0.6 and 0.4 respectively. If the first set wins, the probability of introducing a new product is 0.9 and the corresponding probability if the second set wins is 0.4. What is the probability that new product will be introduced.

[10]
 Ans: 0.70

2. 2054 Q.No. 4 a

A company has two plants to manufacture scooters. Plant I manufactures 80% of the scooters and Plant II manufactures 20%. At Plant I, 85 out of 100 scooters are rated standard is the quality or better. At Plant II, 95 out of 100 scooters are rated standard is the quality or better. What is the probability that the scooter selected at random came from Plant II if it is known that the scooter is of standard quality?

[10]
 Ans: 0.216

3. 2051 Q.No. 1 a

A production process produces light bulbs are 10% defective. Each item is inspected before being exported but the inspector will incorrectly classify an item 10% of the time. Only item classified goods are exported. What production of items shipped are defected? [10]

Ans: $\frac{1}{82}$

4. 2045 Q.No. 1 a

Of 250 employees of a company, a total of 130 smoke cigarettes. There are 150 males working for this company, 85 of the males smoke cigarettes. What is the probability that an employee chosen at random?

- (a) does not smoke cigarettes (b) is female and smokes cigarettes [10]

Ans: (a) $\frac{12}{25}$ (b) $\frac{9}{50}$

5. 2041 Q.No. 1 a

A factory produces a certain types of output by three machines. The respectively daily production figures are: Machine X 1500 units, Machine Y 3000 units and Machine Z 4500 units. Past experience shows that 1.5% of the output produced by Machine X, 2% of the output produced by Machine Y and 2.2% of the output produced by Machine-Z is defective. An item is drawn at random. What is the probability that it comes from output of Machine Y?

[10]
 Ans: 0.331

2. THEORETICAL FREQUENCY DISTRIBUTION

A. BINOMIAL DISTRIBUTION

1. 2070 Q.No. 8a

The probability that a college student will graduate is 0.6. Find the probability that out of 4 students ① none are graduates ② at least one is graduate. [5]

Ans: ① 0.0256 ② 0.9744

2. 2070 Old Q.No. 8a

The mean and standard deviation of a binomial distribution are 20 and 4 respectively; calculate n , p and q . [5]

Ans: $n = 100$, $p = 0.2$ and $q = 0.8$

3. 2068 (Old) Q.No. 7b

If mean of binomial distribution is 3 and variance is 1.5, find the probability of at least four success. [5]

Ans: 0.34375

4. 2067 (II) Q.No. 8a

Fit the binomial distribution for the following data. Assuming the nature of the coin is unknown. [5]

No. of heads:	0	1	2	3	4
Frequency	28	62	46	20	4

Ans: 27; 60; 51; 19; 3

5. 2066 Q.No. 8a (i)

It is known that on an average the probability that Shyam will win the game is 40%. What is the probability that out of 8 games Shyam will win between 2 and 6 games? [5]

Ans: 0.885

6. 2066 Partial Q.No. 8a

A music club in Kathmandu has 1000 members and the probability that a member demands the record of a particular singer is 0.15; at least how much number of records should the club keep in order to ascertain that the chance of accepting a request for the record of any singer is more than 0.90. [5]

Ans: 14

7. 2065 (II) Q.No. 8 b

Fit a binomial distribution for the following assuming the coin as unbiased [5]

No. of heads	0	1	2	3	4
Frequency	28	62	46	20	4

Ans: 10; 40; 60; 40; 10

8. 2063 Q.No. 8 b

Out of 9,000 families 4 children each, how many families would you expect to have 3 boys and 1 girl, the birth of male child and female child is assumed equal? [5]

Ans: 2,250

9. 2057 (II) Q.No. 8 a

Calculate theoretical frequencies from the following by using binomial probability law.

No. of success (x)	5	4	3	2	1	0
Frequency (f)	190	500	900	960	500	150

Assume the probability of success in each case as 0.5. [5]

Ans: 100, 500, 1000, 1000, 500, 100

B. POISSON DISTRIBUTION

MBS

1. 2069 Old Q.No. 7b

A manufacturer of pins knows that on an average 3% of its production is defective. He sells pins in boxes of 100 and guarantees that not more than 3 pins will be defective. What is

the probability that a box selected at random will meet the guaranteed quality? [5]

Ans: 0.6472

2. 2068 Q.No. 8a

The number of accidents in the street of Kathmandu follows Poisson distribution with a mean of 3 accidents per day. Find the probability that (i) no accident occurs in a day (ii) number of accident in a day exceeds 3. [5]

Ans: 0.0498; 0.3528

3. 2068 (Old) Q.No. 7a

If the variance of Poisson distribution is one, find the probability of having exactly 3 accidents in a week. [5]

Ans: 0.0613

4. 2067 (I) Q.No. 7b

The road accident at Koteswor in a year is attributed to truck drivers. The accident from the past records was observed to follow Poisson distribution with average of 10 accidents a year. [$e^{-10} = 0.000045$] There are 1000 truck drivers in that route, what is the number of truck drivers with

- (i) no accidents in a year
(ii) less than 2 accidents in a year. [5]

Ans: (i) 0.045; 0.495

5. 2067 (II) Q.No. 8b (ii)

ii) Certain mass produced articles, of which 0.50% are defective, and packed in cartons each containing 100. What is the probability that a carton selected at random contains, 2 or more defectives [2]

$$e^{-5} = 0.0067$$

$$e^{-0.5} = 0.6065$$

Ans: 0.0925

6. 2067 (II) (Old) Q.No. 8a

The mean and variance of a distribution same. If the mean of the distribution is 3 accidents per week, find the probability that the number of accidents in a week exceeds two. [5]

Ans: 0.5767

7. 2066 Q.No. 8a (ii)

If mean and variance of a distribution is 3, find $P\{x \geq 3\}$. [5]

Ans: 0.577

8. 2066 Partial Q.No. 8b

If mean and variance of a distribution is 2, find the $P\{X < 3\}$.

Ans: 0.577

9. 2063 Q.No. 7 b

A manufacture of pins know on an average 3% of its production is defective. He sells pins in boxes of 100 and guarantees that not more than 2 pins will be defective. What is the probability that a box selected at random?

- i. Will meet the guaranteed quality.
ii. Will not meet the guaranteed quality. [5]

Ans: (i) 0.423 (ii) 0.577

10. 2060 Q.No. 7 b

Fit a Poisson distribution to the following: [5]

Defects (x)	0	1	2	3	4	5
No. of pages (f)	142	156	69	27	5	1

Ans: 147, 147, 74, 15, 6 and 1 [147.152; 147.152; 73.576; 24.525; 6.131; 1.464]

11. 2059 Q.No. 7 a

From past experience it is known that in a certain intersection, there are on the average 4 traffic accidents per week. Find the probability that, in a given week there will be:

- (i) Less than 2 accidents (ii) Exactly 2 accidents (iii) More than 2 accidents. [5]

Ans: (i) 0.09156 (ii) 0.146525 (iii) 0.761915

12. 2057 (I) Q.No. 8 a

Fit Poisson distribution for the following frequency distribution.

[5]

No. of defects (x):	4	3	2	1	0
Frequency (f):	2	3	19	65	11

Ans: 3.382, 8.67, 21.685, 36.143, 30.119

13. 2057 (II) Q.No. 8 b

Find the probability of having exactly 2 accidents in a week by using Poisson approximation. You are given variance of the distribution = 1.

[5]

Ans: 0.184

MBA**1. 2054 Q.No. 1 b**

A systematic sample of 200 pages was taken from the manuscript typed by a typist and observed frequency distribution of the typing mistakes per page was found to be as under

No. of typing mistakes (X)	0	1	2	3	4
No. of pages (F)	122	60	15	2	1

Fit the appropriate frequency distribution to the above data.

[10]

Ans: 121.306, 60.653, 15.163, 2.527, 0.351

2. 2052 Q.No. 1 a

A manufacturer of pins knows that on an average 2% in production is defective. He sells pins in boxes of 100 and guarantee that not more than two pins will be defective. What is the probability that a box randomly selected (a) will meet the guaranteed quality (b) will not meet the guaranteed quality.

[10]

Ans: (a) 0.6765 (b) 0.3235

C. NORMAL DISTRIBUTION**MBS****1. 2071 Q.No. 8a**

In an examination 10% of the students got less than 20 marks and 95% of the students got less than 75 marks. Assuming the distribution to be normal, find mean and standard deviation.

[5]

Ans: 44.12; 18.84

2. 2070 Q.No. 8b

Suppose a doorway is to be constructed for a class of people whose heights are normally distributed with mean 70 inches and standard deviation 3 inches. How much high the doorway should be without causing more than 20% of people to bump their heads? If the height of the doorway may be fixed at 76 inches, how many persons out of 10,000 are expected to bump their heads?

[5]

Ans: 67.48 inches, 228

3. 2069 Q.No. 8

In final examination of statistics subject, the marks obtained by students was observed to be normally distributed with mean of 73 and s.d. of 8.

- What is the probability of a student getting marks more than 60?
- What percentage of students scored marks between 60 to 90?
- Only 5% of the students appearing in the exam scores highest from which marks? [10]

Ans: ① 0.9474 ② 93.04% ③ 86.16 marks

4. 2069 Old Q.No. 8a

The income of a group of 20,000 persons was found to be normally distributed with mean Rs. 7,500 and standard deviation Rs. 500. Find the ① lowest income of richest 20% of persons ② highest income of poorest 10% of persons.

[5]

Ans: ① Rs. 7,920 ② Rs. 6,860

5. 2068 Q.No. 8b)

Incomes of a group of 50,000 persons were found to be normally distributed with mean of Rs.5,200 and standard deviation Rs.100. Find (i) number of persons having income between Rs.5,000 and Rs.5,400 (ii) the lowest income of richest 10,000 persons. [5]

Ans: 47,720; Rs. 5,284

6. 2067 (II) Q.No. 8b(i)

Sacks of grain packed by an automatic machine loader follows normal distribution having an average weight of 114 kgs. It is found that 15% of bags are over 115 kgs. Find the standard deviation. [3]

Normal curve	
Area	Z value
0.35	1.03
0.15	0.38

Ans: 0.971 kgs

7. 2067 (II) (Old) Q.No. 8b)

Incomes of a group of 20,000 persons were found to be normally distributed with mean Rs. 5,000 and standard deviation Rs. 500, find ① lowest income of richest 2000 persons ② highest income of poorest 2000 persons. [5]

Ans: Rs. 5,640; Rs. 4,360

8. 2066 Q.No. 8b)

In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution? [10]

Prob.	Z
(0.07	0.17)
0.39	1.23)
0.43	1.48)
0.11	0.28)

Ans: $\mu = 50.29$ $\sigma = 10.33$ **9. 2065 (I) Q.No. 7 b)**

In an examination it was observed that 10% of the candidates got first class and 30% failed. The pass marks is 40% and first division marks is 60%. Assuming that the marks follow normal distribution, find the mean and standard deviation of the distribution. [5]

Ans: Mean (μ) = 45.7772 and standard deviation (σ) = 11.11**10. 2065 (II) Q.No. 8 a)**

Incomes of group of 10,000 persons were found to be normally distributed with mean Rs. 1,520 and standard deviation 160, find:

- (i) highest income of poorest 2000 persons.
(ii) lowest income of richest 1000 persons

[5]
Ans: (i) Rs. 1385.6 (ii) Rs. 1724.80**11. 2064 Q.No. 7 b)**

The income of a group of 10,000 persons was found to be normally distributed with mean Rs. 750 and s.d. Rs. 50. Find the lowest income of 10% richest persons. [5]

Ans: 814

12. 2063 Q.No. 8 a)

In an examination, 10% of the students got less than 20 marks and 95% of the students got less than 75 marks. Assuming the distribution to be normal, find the mean and standard deviation. [5]

Ans: 44.12; 18.84

13. 2062 Q.No. 8)

Kathmandu Municipality installed 2000 light bulbs in the street of New Baneshwor. If these bulbs have average life of 1000 burning hours with s.d. of 200 hours, and, the life of bulbs are normally distributed, then how many bulbs are expected to fail in (a) less than 700 hours (b) more than 1200 hours (c) between 700 and 1300? [5]

Ans: (a) 133.6 (b) 317.4 (c) 1732.8

14. 2061 Q.No. 8 a

A training program is designed to upgrade the skills of supervisors. Because the program is self administered, supervisors take different number of hours to complete the program. Study shows that the average time spent in training is normally distributed with 500 hours with s.d. 100 hours. What is the probability that a candidate selected at random will take time less than 420 hours?

[5]

Ans: 0.2119

15. 2060 Q.No. 8 b

The marks obtained by 1000 students in an examination are known to be normally distributed. If 15% of the students got less than 30 marks and 10% of the students got over 90, find the mean and variance of the distribution

[5]

Ans: 56.896 and 668.847

16. 2057 (i) Q.No. 8 b

The mean height and variance of height of 500 students were found to be 165 cm. and 25 cm² respectively, find the range of height of middle 80% of the students.

[5]

Ans: 12.8

MBA**1. 2056 Q.No. 1 b**

In an examination, average marks secured by 400 students is 45 with a s.d. of 10. Assuming the distribution to be normal, find

- (i) The number of students securing marks between 50 and 60
(ii) the range of marks within middle 50% of students would lie.

[10]

Ans: (i) 97 (ii) 13.4

2. 2055 Q.No. 1 b

The mean I.Q. (intelligence quotient) of a large number of children of age 14 was 100 and the standard deviation 16. Assuming that the distribution was normal, find between what limits the I.Q.'s of the middle 40% of the children lie?

[10]

Ans: 91.68; 108.32

3. 2054 Q.No. 4 b

The income of a group of 10,000 persons were found to be normally distributed with mean Rs. 750 per month and s.d. Rs. 50. Of this group about 95% had income exceeding Rs. 668 and only 5% had income exceeding Rs. 832. What was the lowest income among the richest 100?

[10]

Ans: 886.5

4. 2053 Q.No. 1 b

Assume that the marks in MBA examination are normally distributed with $\mu = 400$ and $\sigma = 100$. Of 600 students taking this examination, it is described to pass 500 of them, what should be the lowest marks permitted for passing?

[10]

Ans: 303

5. 2052 Q.No. 1 b

Assume that the marks in MBA examination are normally distributed with $\mu = 400$ and $\sigma = 100$. Of 600 students taking this examination, it is described to pass 500 of them, what should be the lowest marks permitted for passing?

[10]

Ans: 303

6. 2051 Q.No. 1 b

The mean weight of products is 68.22 grams with a variance of 10.8 grams. How many products in a batch of 1000 would you expect (i) to be over 72.0 grams, (ii) between 70 and 72 grams?

[10]

Ans: (i) 125 (ii) 170

7. 2050 Q.No. 1 b

In an aptitude test administered to 900 college students the mean was found to be 50 and standard deviation 20. Assume that marks in aptitude test of students approximately follows normal distribution.

- (i) Find the number of students securing between 30 and 70.
(ii) Find the value of the score exceeded the top 90 students.

[10]

Area under the normal curve	0.3413	0.3997	0.4015	0.4332
Value of Z	1.00	1.28	1.29	1.50

Ans: (i) 614 (ii) 75.6

8. 2048 Q.No. 1 b

The heights of 1000 students follow normal distribution with mean 66 and s.d. 2

(i) How many observation may be expected to lie between 63 and 69.

(ii) Find the height in inches beyond which 10% of the students would lie.

[10]

Ans: (i) 866 (ii) 68.56

9. 2046 Q.No. 1 b

Incomes of a group of 10,000 persons were found to be normally distributed with mean Rs. 520 and standard deviation Rs. 60. Find:

[10]

(i) The number of person having income between Rs. 400 and Rs. 550.

(ii) The lowest income of richest 1,000 persons.

Area under the normal curve	0.1915	0.3997	0.4015	0.4772
Value of Z	0.50	1.28	1.29	2.00

Ans: (i) 6687 (ii) 596.8

10. 2045 Q.No. 1 b

In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and the standard deviation of the distribution.

[10]

Ans: 49.975; 9.95

11. 2042 Q.No. 1 a

In an examination 15% of the candidates got first class (60 marks or above) while 40% failed (securing below 40). Assuming the marks to be normally distributed estimate the mean and standard deviation.

[10]

Ans: 43.875; 15.5

12. 2041 Q.No. 1 b

A banker claims that the life of a regular savings account opened in his bank averages 18 months with a standard deviation of 6.45 months. What is the probability that:

(i) There will still be money in a savings account between 20 to 22 months by a depositor.

(ii) The bank will be closed (no money in the deposit) after two years?

[10]

Ans: (i) 0.1107 (ii) 0.1762

13. 2040 Q.No. 5 a

Ram and Co. manufactures chrome and glass lamp manually. It requires 40 labour hours to complete on with a standard deviation of 10 hours.

(i) What is the probability that it will take between 35 and 42 labour hours to complete one of the lamps?

(ii) What is the probability that it will take more than 48 hours?

[10]

Ans: (i) 0.2708 (ii) 0.2119

3. SAMPLING**THEORETICAL QUESTIONS****1. 2059 Q.No. 12 a**

Explain the utility of standard error in testing of hypothesis.

[5]

2. 2057 (I) Q.No. 9 b

Describe the sources of sampling error and non-sampling error.

[5]

WRITE SHORT NOTES ON**3. 2067 (I) Q.No. 12c**

Simple random sampling

[5]

4. 2067 (II) Q.No. 12 d

Sampling its merits and demerits

4. ESTIMATION

MBS

THEORETICAL QUESTIONS

1. 2065 (I) Q.No. 8 b

Explain the criteria that a good estimator has to possess.

[5]

WRITE SHORT NOTES ON

2. 2067 (I) Q.No. 12a

Interval estimation

[5]

3. 2067 (II) Q.No. 12 b

Characteristics of a good estimator

4. 2066 Q.No. 12

- a. Point and interval estimation
b. Determination of sample size

[5]

[5]

NUMERICAL PROBLEMS

5. 2071 Q.No. 8b

A researcher wants to estimate the mean of a population by using sufficiently large sample. The probability is 0.95 that the sample mean will not differ from true mean by more than 20% of the population standard deviation. How large should the sample size be?

[5]

Ans: 96

6. 2070 Q.No. 9b

A sample of 700 units from a large consignment showed that 200 units were damaged. Find 95% confidence limits for the proportion of damaged units in the consignment.

[5]

Ans: (0.2563, 0.3237)

7. 2070 Old Q.No. 8b

What should be the minimum sample size so that sampling error may not be more than 2 units in 98% of the chance when population standard deviation is 20?

[5]

Ans: 543

8. 2069 Q.No. 9a

A manager of paint-supply store wants to estimate the average amount of paint in a 1-gallon jar to within ± 0.004 gallon with 95% confidence. He assumes that the s.d. is 0.02 gallon. Estimate the sample size the manager needs to survey.

[5]

Ans: 96

9. 2069 Old Q.No. 8b

A sample of 64 students appearing in an examination yield the error as 5 with standard deviation of 4. In the study, if sample size is increased to 144, how will risk be affected, the standard deviation and error remaining the same.

[5]

Ans: Increasing sample size from 64 to 144 risk will not be affected

10. 2068 Q.No. 9b

A researcher wants to estimate the mean of a population by using sufficiently large sample. The probability is 0.99 that the sample mean will not differ from actual mean by more than 5% of the standard deviation. How large should be the sample?

Ans: $n = 2663$ OR $Z_{0.05} = 2.575$; $n = 2652$

11. 2068 (Old) Q.No. 8b

A researcher wishes to estimate the mean of a population by using sufficiently large sample. The probability is 0.99 that the sample mean will not differ from the true mean by more than 20% of the population standard deviation. How large should be the sample size?

[5]

Ans: 166

12. 2067 (I) Q.No. 8a

The inspection division of Nepal Standard and Meteorology Department wants to estimate the mean amount of soft-drink fill in 2 - litre bottle to within ± 0.01 litre with 95% confidence. He assumes that the s.d. is 0.05 litre, what sample size the department need to survey? [5]

Ans: 96.04 \approx 96**13. 2067 (II) Q.No. 10a**

A survey of 500 peoples shopping at a Shopping Mall, selected at random, shows that 350 of them used cash and 150 of them used credit cards. Construct a 95% confidence interval estimate of the proportion of all the persons at the mall who uses cash for shopping. [5]

Ans: (0.6598, 0.7402)

14. 2066 Partial Q.No. 9

- a. From the consignment of 100 apples 20 apples is drawn by simple random sampling method without replacement. If out of the 20 apples 15 apples found defective, what should be the standard error of the sample proportion?
- b. From a sample of 400 computed mean and standard error of mean found to be 125 and 2.5 respectively. What sample should be taken to insure 99% confidence that the population mean lies within in more or less 5 of the sample mean?

Ans: (a) 0.087 (b) 666

15. 2065 (I) Q.No. 10 b

If the population proportion of success is 0.65 and $n = 100$, what will be the value of sampling error when acceptance region is 0.95? [5]

Ans: 0.0935

16. 2064 Q.No. 10 b

A sample of 500 bulbs of a company showed an average life of 1400 hours with standard deviation of 30 hours. Obtain 95% and 99% fiducial limits for population mean. [5]

Ans: (1397.37; 1402.63) and (1396.54; 1403.66)

17. 2063 Q.No. 10 a

In a sample of 400 oranges from a large consignment, 40 were considered bad. Estimate the percentage of defective oranges in the whole consignment and assign limits within which the percentages will probably lie. [5]

Ans: 5.5% to 14.5%.

18. 2061 Q.No. 12 b

In a study of time and motion in a factory, the supervisor estimates the S.D. to be 0.95 seconds. If you want to be 95% confident that the error will not exceed 0.01 second, what should be the size of the sample to estimate population mean? [5]

Ans: 34,670

19. 2060 Q.No. 9 b

The mean income of 100 employees of a factory was found to be Rs.5,000 with standard deviation of 60. Find 95% confidence limit for the mean income of all the employees of the factory. [5]

Ans: 4988.24 and 5011.76

20. 2058 Q.No. 9 a

A sample of 64 students appearing in CMAT examination yield the error as 5 with standard deviation of 4. In the study, if the sample size is increased to 144, how will the risk be affected, the s.d., error remaining the same. [5]

Ans: $\alpha = 0$, new $\alpha = 0$, not changed**21. 2057 (I) Q.No. 9 a**

A random sample of 25 showed a mean of 65 inches with a standard deviation of 25 inches. Determine 98% confidence interval for the mean of the population. [5]

Ans: 52.54, 77.46

22. 2057 (II) Q.No. 9 b

A researcher wants to estimate universe mean by using sampling technique. What should be the sample size when the permissible error between parameter value and sample statistic in 95% of chance will not be more than 1.5 and population standard deviation is 15.

[5]

Ans: Rs. 384.16 ≈ 384

MBA**1. 2055 Q.No. 3 b**

The average outstanding balance of loans issued by a bank varies from month to month. From past experience it is known that the amounts are normally distributed with a standard deviation of Rs. 5,000. The bank wishes to estimate the average by drawing a random sample such that the probability is 0.95 that the mean of the sample will not deviate by more than Rs. 600 from the universe mean. What should be the sample size?

[10]

Ans: 267

2. 2054 Q.No. 5 a

The business manager of a large company wants to check the inventory records against the physical inventories by a sample survey. He wants to almost assure that the maximum sampling error should not be more than 5% above or below the true proportion of the inaccurate records. The proportion of the inaccurate records is estimated at 35% from past experiences. Determine the sample size.

[10]

Ans: 350

5. TESTING OF HYPOTHESIS**WRITE SHORT NOTES ON****1. 2066 Q.No. 12c**

Level of significance

A. MEAN (Z-TEST)**MBS****2. 2070 Q.No. 9a**

Before an increase in excise duty on cigarette, 400 out of a sample of 500 persons were smokers. After the increase in excise duty 400 out of a sample of 600 persons were found to be smokers. Was the observed decrease in proportion of smokers significant?

[5]

Ans: $Z = 4.819$, reject H_0 **3. 2069 Q.No. 9b**

At a particular bank branch the expected mean amount of money withdrawn from ATM's per customer transaction over the weekend is Rs. 2,500 with an estimated s.d. of Rs. 600. A random sample of 64 customer transaction is examined and the sample mean withdrawal from ATM is found to be Rs. 3,200. From the data can you conclude at 1% level of significance that the sample average is higher than expected?

[5]

Ans: $Z = 9.33$, reject H_0 **4. 2068 Q.No. 9a**

The mean height of 100 students of a campus was found to be 170 cms. Can the sample be regarded as a sample drawn from a large population with mean height 172 cms and standard deviation 3.5 cms?

[5]

Ans: $|z| = 5.71$; reject, H_0 , not from normal population with mean 172cms**5. 2068 (Old) Q.No. 9a**

A sample of 64 glass rods was taken from a lot manufactured under a new process and tested for their breaking strength. The mean breaking strength of the sample was found to be 20 kgs and standard deviation 4 kgs. Test the hypothesis that the average breaking strength of glass rod is 24 kgs. Use 5% level of significance.

[5]

Ans: $|z| = 8$, Reject H_0

6. 2067 (II) Q.No. 10b

Section	Sample size	Mean score	Sample std. dev.
A	160	179	18
B	150	175	19

Is there a significant difference in the mean score of the students of two section of a college? [5]

Ans: No significant difference between the mean score of the students of two section of a college.

7. 2067 (II) (Old) Q.No. 9a

Give $n = 400$ $\bar{x} = 500$ $\sigma = 150$

Compute standard error of the mean and test whether the mean of the population is 520 or not at 1% level of significance. [5]

Ans: 7.5; Z = 2.67; Not

8. 2066 Q.No. 9b

A random sample of 400 members is found to have a mean of 4.45cm. Can it be reasonably regarded as a sample from a large population whose mean is 5.0cm and whose variance is 4?

Ans: Z = 6.5; Reject H_0

9. 2065 (I) Q.No. 8 a

A college conducts survey to test whether there is any difference of score in assessment in the subject 'Research Methodology and Statistical Methods' for morning-programme students and day-programme students. A sample of 50 students in the morning yield average score in assessment as 80% with s.d. 14%. Similarly, a sample of 50 students in day-programme yield average assessment score of 92% with s.d. 25%. Based on the data what conclusions do you make? [5]

Ans: $|Z| = 2.962$; H_0 is rejected.

10. 2065 (II) Q.No. 9 a

College	sample size	mean grade	sample std. dev.
P	160	179	18
Q	150	175	19

Is there a significant difference in the mean grade of the students at the two colleges P and Q?

Ans: 1.899; H_0 is accepted

11. 2063 Q.No. 10 b

Samples of two types of electric light bulbs were tested for length of life and following data were obtained.

Type I	$n_1 = 50$	$\bar{X} = 1234$ hrs	$S_1 = 36$ hrs
Type II	$n_1 = 50$	$\bar{X} = 1036$ hrs	$S_1 = 40$ hrs

Is the difference in the means sufficient to warrant that Type I is superior to Type II regarding the length of life? [5]

Ans: Z = 26.02, (reject H_0) significant

12. 2059 Q.No. 8 a

A study on expenditure behaviour of tourists in Nepal revealed that the average expenditure of 100 European tourist per day is NRs. 9200 with standard deviation of NRs. 600. Also, the average expenditure of 100 American tourists per day is NRs. 10000 with standard deviation of NRs. 500. Can you conclude that the expenditure behaviour of European and American tourists are same? [5]

Ans: Z = 10.2429, (reject H_0) significant

MBA

1. 2053 Q.No. 4 b

In a certain factory there are two independent processes manufacturing the same item. The average weight in a sample of 250 items produced from one process is found to be 120 grams with a standard deviation of 12 grams. While the corresponding figures in a

sample of 400 items from the other process are 124 gm and 14 gm. Find the standard error of the difference of means and also test whether the two means differ significantly or not at 5 percent level of significance. [10]

Ans: - 3.874, (reject H_0) significant

2. 2052 Q.No. 2 a

A moped manufacturer hypothesized that the mean miles per gallon for its moped is 115.2. It takes a sample of 49 mopeds and finds the sample mean to be 117.4 per gallon. If the population standard deviation is known to 8.4, test the hypothesis that the true mean miles per gallon is 115.2 against the alternative hypothesis that it is greater than 115.2 using the 0.05 significance level. [10]

Ans: 1.83, (reject H_0) significant

3. 2050 Q.No. 2 a

The average height of 50 students who showed athletic interest was 68.2 inches with a standard deviation of 2.5 inches, while another set of 50 students who showed no athletic interest has the average height of 67.5 inches with a standard deviation of 2.8 inches. Test the hypothesis that athletic interest makes a student taller. [10]

Ans: 1.32, (accept H_0) not significant

4. 2046 Q.No. 2 a

A sample of 400 male students is found to have a mean height of 171.38 cm. Can it be reasonably regarded as a sample from a large population with mean height 171.17 cm and standard deviation 3.30 cm. [10]

Ans: 1.27, (accept H_0) not significant

5. 2042 Q.No. 2 b

A potential buyer of light bulbs bought 50 bulbs of each of two brands. Upon testing these bulbs, he found that brand A had a mean life of 1282 hours with a standard deviation of 80 hours whereas B has a mean life of 1208 hours with a standard deviation of 94 hours. Can the buyer be quite certain that the two brands do differ in quality? [10]

Ans: 4.24, (reject H_0) significant

6. 2039 Q.No. 5 b

A sample of 50 pieces of a certain type of string was tested. The mean breaking strength turned out to be 14.5 kgs. Test whether the sample is from a batch of strings having a mean breaking strength of 15.6 kgs and standard deviation of 2.2. kgs. [10]

Ans: 3.54, (reject H_0) significant

B. PROPORTION (Z-TEST)

MBS

NUMERICAL PROBLEMS

1. 2070 Old Q.No. 9a

A sample of 600 persons selected randomly from a large city gives the result that males are 53%. Is there reason to doubt the hypothesis that males and females are in equal number in the city? [5]

Ans: $z = 1.47$; accept H_0

2. 2069 Old Q.No. 9a

Before an increase in excise duty on coffee 800 out of a sample of 1000 persons were known to be taking coffee. After the increase in duty, 800 persons were found taking coffee in a sample of 1200. Do you think that there has been a significant decrease in the consumption of coffee after the increase in excise duty? [5]

Ans: $Z = 6.97$, reject H_0

3. 2067 (I) Q.No. 8b

The director of a HRD of a company realises that 90% of the employees are eligible for internal promotion based on their qualification, training and working experience. The director then conduct interview of the all employees that was 144. From the interview, it was found that only 80% of the employees were really qualified for promotion. Test appropriate hypothesis to know whether the population proportion is smaller. [5]

Ans: 4