Course Structure for S.Y. B.Com. BUSINESS STATISTICS (2019 Pattern)

Name of the Programme   : T.Y. B.Com.

Program Code   : COMBS

Class   : T.Y. B.Com.

Semester   : VI

Paper Code	Title of Paper	No. of Credits
COMBS3605(D)	Business Statistics-V	3
COMBS3606(D)	Business Statistics-VI	3

Program Outcomes (POs) For B.Com Programme

PO1	**Knowledge and Critical Thinking :** Acquire skills in organizing, analyzing, evaluating and presenting information. Able to analysis issues logically, consider different options and viewpoints, make decisions and act with flexibility, adaptability and creativity.
PO2	**Communication Skill :** Able to communicate effectively, analyze the concepts and participate in healthy arguments and portray skill in communication and in writing. Possess skills related with banking and other business.
PO3	**Independent learning :** Demonstrate the ability to acquire knowledge and business skills, the capacity for self- directed activity and the ability to work independently.
PO4	**Leadership quality :** Exhibit qualities associated with leadership such as accountability, integrity, respect, self-reflection
PO5	**Teamwork:** Able to work constructively, cooperatively, effectively and respectfully as part of a team.

(2019 Pattern)
(With Effect from Academic Year 2021-2022)

Paper Code   : COMBS3605 D
Paper   : V   Title of Paper   : Business Statistics V
Credit   : 3 credits   No. of lectures: 48

A) Course Objectives:

1. To find various measures of r.v. and probabilities using Normal distribution.

2. To understand concept of Testing of Hypothesis with real life situations.

3. To understand large sample test and small sample tests.

4. To understand non-parametric tests.

B) Course Outcomes:

Students should be able to:

CO1. define the normal distribution and its characteristics also can recognize the bell-shaped curve and symmetry of the distribution.

CO2. apply normal distribution concepts to real-world scenarios, such as height, IQ scores, and test scores.

CO3. compute probabilities using z-scores and the standard normal distribution.

CO4. apply testing of hypotheses to real life situations.

CO5. understand tests for means and proportions based on normal distribution.

CO6. apply tests for means based on t distribution and paired t-test.

CO7. apply Chi-square, F tests, non-parametric tests.

TOPICS/CONTENTS:

UNIT-1. Normal Distribution: (12 L)

1.1 Definition, p.d.f., properties of normal distribution

1.2 mean and variance, standard normal variate,

1.3 problems to evaluate probabilities (using statistical table and excel)

1.4 additive property for two variables (statement only).

1.5 Fitting of normal distribution using Excel.

1.6 Examples and problems.

UNIT-2. Large Sample Test   (14 L)

2.1 Definitions of Hypothesis, Null hypothesis, Alternative hypothesis, Critical region, Types of Errors, Level of significance, P-value.

2.2 Test for Population Mean (for large and exact sample): Describe test procedure for testing.

    i. $H_0 : \mu = \mu_0$ against $H_1: \mu \neq \mu_0$ and

    ii. $H_0: \mu_1 = \mu_2$ against $H_1: \mu_1 \neq \mu_2$. If population variance is known.

2.3 Test for population proportion: Describe test procedures for testing

    i. $H_0: P = P_0$ against $H_1: P \neq P_0$ and

    ii. $H_0: P_1 = P_2$ against $H_1: P_1 \neq P_2$.

UNIT-3. Small Sample Test (14 L)

   3.1   Test for Population Mean: Describe test procedure for testing

       i. $H_0: \mu = \mu_0$ against $H_1: \mu \neq \mu_0$ and

       ii. $H_0: \mu_1 = \mu_2$ against $H_1: \mu_1 \neq \mu_2$. If population variance is unknown

   3.2   Describe the test procedure for paired t-test.

   3.3   Describe Chi-square test for testing

       i. Goodness of fit.

       ii. Independence of attributes.

   3.4   Describe test procedure for testing $H_O: \sigma_1^2 = \sigma_2^2$ against $H_1: \sigma_1^2 \neq \sigma_2^2$ (test based on F-distribution)

UNIT-4. Non-parametric Test (8 L)

   4.1   Introduction to Non-Parametric tests

   4.2   sign test

   4.3   run test

   4.4   Kolmogrove – Smirnov test

   4.5   Mann whitney test

List of Practical's:

1. Applications of Normal distribution.

2. Testing of population means and proportions.

3. Test based on Chi-square and F distributions.

4. Non parametric test.

Books Recommended:

1. Parimal Mukhopadhya: An Introduction to the Theory of Probability. World Scientific Publishing.

2. S. C. Gupta.: Fundamentals of Statistics (Third edition), Sultan Chand & Sons, New Delhi.

3. Gupta S. C. &Kapoor V. K.: Fundamentals of Mathematical Statistics. (Eleventh Edition), Sultan Chand and Sons, 23, Daryaganj, New Delhi, 110002.

4. Goon A. M., Gupta, M. K. and Dasgupta, B. (1986), Fundamentals of Statistics, Vol. 2, World Press, Kolkata

5. Course Outcomes	Program Outcomes				
	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	1	1
CO2	3	2	3	1	1
CO3	3	2	3	1	1
CO4	3	2	3	1	1
CO5	3	2	3	1	1
CO6	3	2	3	1	1
CO7	2	2	3	1	1

Weight: 1 - Partially related   2 - Moderately Related 3 - Strongly related

Justification:

PO1 Knowledge and Critical Thinking:
CO1: Define the normal distribution and its characteristics; also, recognize the bell-shaped curve and symmetry of the distribution.
Weightage: 3 (Strongly Related)
Justification: Defining the normal distribution and understanding its characteristics requires knowledge and critical thinking about statistical concepts, making it strongly related.
CO2: Apply normal distribution concepts to real-world scenarios, such as height, IQ scores, and test scores.
Weightage: 3 (Strongly Related)
Justification: Applying normal distribution to real-world scenarios involves critical thinking to relate theoretical concepts to practical situations, making it strongly related.
CO3: Compute probabilities using z-scores and the standard normal distribution.
Weightage: 3 (Strongly Related)
Justification: Computing probabilities using z-scores involves applying critical thinking skills to statistical concepts, establishing a strong connection with knowledge.
CO4: Apply testing of hypotheses to real-life situations.
Weightage: 3 (Strongly Related)
Justification: Applying hypothesis testing to real-life situations involves critical thinking and knowledge of statistical methodologies, making it strongly related.
CO5: Understand tests for means and proportions based on the normal distribution.
Weightage: 3 (Strongly Related)
Justification: Understanding tests for means and proportions based on normal distribution requires critical thinking about statistical inference, aligning closely with knowledge.
CO6: Apply tests for means based on t distribution and paired t-test.
Weightage: 3 (Strongly Related)
Justification: Applying tests for means using t distribution involves critical thinking in choosing appropriate statistical tests, establishing a strong connection with knowledge.
CO7: Apply Chi-square, F tests, non-parametric tests.
Weightage: 2 (Moderately Related)
Justification: Applying Chi-square, F tests, and non-parametric tests involves knowledge and critical thinking, but it's more specialized and, therefore, moderately related.

PO2 Communication Skill:
All COs (CO1 to CO7):
Weightage: 2 (Moderately Related)
Justification: Effectively communicating statistical concepts, applications, and results requires clear communication skills, making all COs moderately related to communication skills.

PO3 Independent Learning:
All COs (CO1 to CO7):
Weightage: 3 (Strongly Related)
Justification: All outcomes involve complex statistical concepts, necessitating independent learning for understanding and application.

PO4 Leadership Quality:
All COs (CO1 to CO7): Weightage: 1 (Partially Related)
Justification: Statistical concepts are more directly related to individual understanding and problem-solving than leadership qualities. However, the ability to apply these concepts in leadership decisions may still be relevant.

PO5 Teamwork:
All COs (CO1 to CO7):
Weightage: 1 (Partially Related)
Justification: Statistical analyses are more individually focused, with limited direct relevance to teamwork.

SYLLABUS (CBCS) FOR T. Y. B. Com. (Semester- VI) STATISTICS
(2019 Pattern)
(With Effect from Academic Year 2021-2022)

Paper Code   : COMBS3606 D
Paper   : VI   Title of Paper   : Business Statistics VI
Credit   : 3 credits   No. of lectures: 48

A) Course Objectives:

1. To study different optimization techniques.

2. To study simulation.

3. To know and understand the statistical techniques to solve some real-life problems.

4. Numerical examples to include real life problems from the field of Commerce to make the students understand the application of statistics.

B) Course Outcomes:

Students should be able to

CO1. study different types of optimization techniques

CO2. use of statistical tools in business.

CO3. develop the abilities in project evaluation techniques like PERT, CPM etc.

CO4. generate random numbers and random variates using different techniques.

CO5. draw the model samples from different standard distributions.

CO6. apply of queuing models in real life problem.

CO7. understand deterministic and probabilistic inventory control models.

CO8. find optimal sequence of jobs which minimizes the total elapsed time also their applications of real life.

TOPICS/CONTENTS:

UNIT 1   CPM/PERT: (16L)

Meaning and scope, activity, event, node, network, path, critical path, slack, float (total, free, independent), forward pass and backward pass methods. Pessimistic, most likely and Optimistic times in PERT, mean and variance for each activity, expected duration of project, probability of completion of project, Examples and problems.

UNIT 2   Simulation: (8L)

Meaning and scope, Advantages and disadvantages of simulations, Examples and problems, step wise procedure of drawing model sample using EXCEL from i) uniform distribution and

ii) normal distribution using Box-Muller transformation.

UNIT 3 Queuing Theory: (8L)

Meaning, calling population, queue discipline, inter arrival rate, service rate, traffic intensity, single channel Poisson arrival with exponential service rate, average waiting time in i) queue and ii) system, average length of i) queue and ii) system. Examples and problems.

UNIT 4 Inventory Control: (10L)

Meaning and necessity of inventory control. Deterministic inventory Model: Economic order quantity for instantaneous replenishment with uniform demand and a) shortages not allowed, b) shortages allowed, Lead time, Re – order level and Buffer stock, Probabilistic Inventory Model: Single period probabilistic model without set up costs.

UNIT 5 Sequencing Problem: (6L)

Concept of sequencing, sequencing of n jobs through 2 machines, and n jobs through 3 machines. Stepwise procedure. Examples to determine the sequencing and total time required. Also, to find Idle time of the machine.

List of Practical's :

1. Game Theory (Using Tora)
2. Statistical Decision Theory
3. Statistical Quality Control
4. CPM/PERT (Using Tora)
5. Simulation Using Excel
6. Queuing Theory

Books Recommended:

1. Operations Research : Harmdy, Taha
2. Operations Research: Kantiswroop, Gupta
3. Business Mathematics : J. K. Sharma
4. Statistical Quality Control: Montgomery
5. Fundamentals of Mathematical Statistics: Gupta, Kapoor V.K
6. Fundamentals of Statistics: S.C. Gupta

Course Outcomes	Programme Outcomes (POs)				
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CO4	3	2	3	1	1
CO5	3	2	3	1	1
CO6	3	2	3	1	1
CO7	3	2	3	1	1
CO8	3	2	3	1	1

Weight:　　　1 - Partially related　　　2 - Moderately Related　　　3 - Strongly related

Justification:

PO1 Knowledge and Critical Thinking:

CO1: Study different types of optimization techniques.

Weightage: 3 (Strongly Related)

Justification: Studying optimization techniques requires critical thinking and a deep understanding of various methods, aligning strongly with knowledge and critical thinking skills.

CO2: Use statistical tools in business.

Weightage: 3 (Strongly Related)

Justification: Applying statistical tools in business involves critical thinking and a strong knowledge base in both statistics and business, making it strongly related.

CO3: Develop abilities in project evaluation techniques like PERT, CPM, etc.

Weightage: 3 (Strongly Related)

Justification: Project evaluation techniques demand critical thinking and a comprehensive understanding of methods like PERT and CPM, demonstrating a strong connection with knowledge.

CO4: Generate random numbers and random variates using different techniques.

Weightage: 3 (Strongly Related)

Justification: Generating random numbers requires knowledge of different techniques and critical thinking to apply them appropriately, making it strongly related.

CO5: Draw model samples from different standard distributions.

Weightage: 3 (Strongly Related)

Justification: Drawing model samples involves critical thinking in selecting appropriate distributions and applying knowledge of statistical concepts.

CO6: Apply queuing models in real-life problems.

Weightage: 3 (Strongly Related)

Justification: Applying queuing models requires critical thinking and knowledge of modeling real-life systems, aligning closely with knowledge and critical thinking skills.

CO7: Understand deterministic and probabilistic inventory control models.

Weightage: 3 (Strongly Related)

Justification: Understanding inventory control models involves critical thinking and a solid knowledge base in both deterministic and probabilistic scenarios.

CO8: Find optimal sequence of jobs that minimizes the total elapsed time and their applications in real life.

Weightage: 3 (Strongly Related)

Justification: Finding optimal job sequences requires critical thinking and knowledge of optimization techniques, closely aligning with knowledge and critical thinking skills.

PO2 Communication Skill:

All COs (CO1 to CO8):

Weightage: 2 (Moderately Related)

Justification: Effectively communicating optimization techniques, statistical analyses, and modeling concepts is essential, contributing to moderately related communication skills.

PO3 Independent Learning:

All COs (CO1 to CO8):

Weightage: 3 (Strongly Related)

Justification: All outcomes involve complex concepts that necessitate independent learning for understanding and application.

PO4 Leadership Quality:

All COs (CO1 to CO8):

Weightage: 1 (Partially Related)

Justification: While optimization and project management skills may be relevant to leadership, the direct connection to leadership qualities is less pronounced.

PO5 Teamwork:

All COs (CO1 to CO8):

Weightage: 1 (Partially Related)

Justification: These outcomes, while involving problem-solving, are more individually focused and have limited direct relevance to teamwork.