PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Branch - **COMMERCE (BUSINESS ANALYTICS)**

STATISTICS FOR BUSINESS ANALYTICS

Time: Three Hours | Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The primary purpose of a statistical investigation is: a) To confuse data b) To collect, classify, and interpret data c) To summarize data without analysis d) To memorize data	K1	CO1
	2	Which of the following is not a source of secondary data? a) Census reports b) Published journals c) Direct interview d) Government records	K2	CO1
2	3	Pictogram represents data using: a) Bars b) Pictures or symbols c) Circles d) Frequency curves	K1	CO2
	4	A histogram is used for: a) Discrete series b) Continuous series c) Individual series d) Nominal data	K2	CO2
3	5	The lottery method is used in: a) Systematic sampling b) Simple random sampling c) Stratified sampling d) Cluster sampling	K1	CO3
	6	Which of the following is a non-probability sampling method? a) Random sampling b) Cluster sampling c) Judgment sampling d) Stratified sampling	K2	CO3
4	7	The most commonly used average is: a) Median b) Mode c) Arithmetic Mean d) Geometric Mean	K1	CO4
	8	The median is not affected by: a) Extreme values b) All observations c) Sample size d) Order of data	K2	CO4
5	9	If mean = median = mode, then the distribution is: a) Positively skewed b) Negatively skewed c) Symmetrical d) Nuaral	K1	CO5
	10	Kurtosis measures: a) Degree of skewness b) Peakedness of a curve c) Dispersion d) Central tendency	K2	CO5

SECTION - B (35 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the steps involved in planning a statistical investigation.	K1	CO1
		(OR)		
	11.b.	Write a short note on classification and tabulation of data.		

Cont...

<table>
<tr><td rowspan="3">2</td><td>12.a.</td><td colspan="2">What are the essential features of a good questionnaire?</td><td rowspan="3">K2</td><td rowspan="3">CO2</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>12.b.</td><td colspan="2">Prepare and explain graphs of frequency distribution for a given data set.</td></tr>
<tr><td rowspan="3">3</td><td>13.a.</td><td colspan="2">Discuss the methods of sampling with examples</td><td rowspan="3">K3</td><td rowspan="3">CO3</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>13.b.</td><td colspan="2">Explain in detail Simple Random Sampling (SRS) using the lottery and random number methods.</td></tr>
<tr><td rowspan="3">4</td><td>14.a.</td><td colspan="2">The Marks obtained by students are given below.
Calculate Geometric Mean
<table><tr><td>Marks</td><td>10</td><td>20</td><td>30</td><td>40</td><td>50</td></tr><tr><td>Frequency</td><td>4</td><td>6</td><td>5</td><td>3</td><td>2</td></tr></table></td><td rowspan="3">K4</td><td rowspan="3">CO4</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>14.b.</td><td colspan="2">Calculate the Arithmetic Mean from the following data:
<table><tr><th>Class Interval</th><th>Frequency</th></tr><tr><td>0 – 10</td><td>4</td></tr><tr><td>10 – 20</td><td>8</td></tr><tr><td>20 – 30</td><td>10</td></tr><tr><td>30 – 40</td><td>6</td></tr><tr><td>40 – 50</td><td>2</td></tr></table></td></tr>
<tr><td rowspan="3">5</td><td>15.a.</td><td colspan="2">Calculate the Range and Coefficient of Range from the following data: 20, 25, 35, 40, 50, 60, 75, 80</td><td rowspan="3">K4</td><td rowspan="3">CO5</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>15.b.</td><td colspan="2">Find Karl Pearson's Coefficient of Skewness and interpret the result:
<table><tr><td>X</td><td>100</td><td>200</td><td>300</td><td>400</td><td>500</td></tr><tr><td>f</td><td>4</td><td>6</td><td>10</td><td>8</td><td>2</td></tr></table></td></tr>
</table>

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Describe the procedure for collecting primary data, and explain how errors can be minimized in data collection.	K2	CO1
2	17	Discuss the techniques of graphical presentation and their advantages in data interpretation.	K2	CO2
3	18	Compare stratified sampling, systematic sampling, and cluster sampling.	K3	CO3
4	19	From the following data, find the Arithmetic Mean, Median, and Mode and compare their values. <table><tr><th>Class Interval</th><th>Frequency</th></tr><tr><td>0 – 10</td><td>6</td></tr><tr><td>510 – 20</td><td>8</td></tr><tr><td>20 – 30</td><td>10</td></tr><tr><td>30 – 40</td><td>12</td></tr><tr><td>40 – 50</td><td>9</td></tr><tr><td>50 – 60</td><td>5</td></tr></table>	K4	CO4
5	20	Compute Quartile Deviation and Coefficient of Quartile Deviation from the following data <table><tr><th>Class Interval</th><th>Frequency</th></tr><tr><td>0 – 10</td><td>6</td></tr><tr><td>10 – 20</td><td>10</td></tr><tr><td>20 – 30</td><td>8</td></tr><tr><td>30 – 40</td><td>4</td></tr><tr><td>40 – 50</td><td>2</td></tr></table>	K4	CO5

Z-Z-Z END

25CBA103

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Branch – **COMMERCE (BUSINESS ANALYTICS)**

MATHEMATICAL TECHNIQUES FOR BUSINESS ANALYTICS

Time: Three Hours | Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	An annuity refers to a) A loan with compound interest b) Equal payments made at regular intervals c) A geometric progression d) One-time investment	K1	CO1
	2	Which is correct about Geometric Progression (GP)? a) Successive terms differ by a constant b) Successive terms have a constant ratio c) Always increasing sequence d) Always convergent	K2	CO1
2	3	The identity matrix is always a a) Zero Matrix b) Rectangular Matrix c) Square Matrix d) Column Matrix	K1	CO2
	4	If A $\begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$ then $\|A\|$ (determinant) is a) 5 b) 6 c) 7 d) 3	K2	CO2
3	5	The slope of the line joining points $(x1, y1)$ and $(x2, y2)$ is a) $\frac{x2-x1}{y2-y1}$ b) $\frac{y2-y1}{x2-x1}$ c) $(x2-x1)(y2-y1)$ d) $\frac{y1+y2}{x1+x2}$	K1	CO3
	6	If demand curve is given by Dx =100 – 2P, then the slope is a) -2 b) 2 c) 100 d) -100	K2	CO3
4	7	Which rule is used to differentiate f(x) $g(x)$? a) Chain rule b) Quotient Rule c) Product Rule d) Implicit Rule	K1	CO4
	8	The second derivative of $y = x^3$ is a) 3 b) $6x$ c) $3x^2$ d) $6x^2$	K2	CO4
5	9	The integral of Cos x is a) $\sin x + c$ b) $-\sin x + c$ c) $\cos x + c$ d) $\tan x$	K1	CO5
	10	If $\frac{dy}{dx} = 6x$, then y a) $3x^2 + c$ b) $2x^2 + c$ c) $6x^2 + c$ d) $x^3 + c$	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Find the sum to n terms of the series 3, 2, 4/3, 8/9, ...	K3	CO1
		(OR)		
	11.b.	Find the simple interest on Rs.5,000 at 10% for 3 years. Find also the amount.		
2	12.a.	Show that matrix multiplication is not commutative, for the following matrices $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$.	K4	CO2
		(OR)		
	12.b.	Find the adjoint of $\begin{bmatrix} 3 & 1 & 2 \\ 2 & 2 & 5 \\ 4 & 1 & 0 \end{bmatrix}$.		
3	13.a.	Find the condition for the lines $ax + by + c = 0$ and $a_1x+b_1y+c_1 = 0$ to be parallel.	K4	CO3
		(OR)		
	13.b.	Find the equation of the circle with center at (2,-3) and radius 5.		
4	14.a.	If $x = a\cos\theta$, y=b $\sin\theta$, find $\frac{dy}{dx}$	K3	CO4
		(OR)		
	14.b.	The total cost in Rs. of output x *is* given by c = $\frac{2}{3}x + \frac{35}{2}$. Find a cost when output is 4 units.		
5	15.a.	Evaluate $\int \frac{x^3}{(x^2+1)^3}\, dx$.	K4	CO5
		(OR)		
	15.b.	Evaluate $\int_0^1 x(1+x)\, dx$.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	On what sum of money will be the difference between the simple interest and the compound interest for 2 years at 5% per annum be equal to Rs. 50?	K3	CO1
2	17	A company is considering which of the three methods of production it should use to produce three goods A,B and C. The amount of each good produced by each method is show in the matrix. 	A	B	C	 Method 1 | 4 | 8 | 2 Method 2 | 5 | 7 | 1 Method 3 | 5 | 3 | 9 The vector (or row matrix) (10,4,6) represents the profit per unit for the goods A,B and C in order using matrix multiplication. Find which method maximize the total profit.	K4	CO2
3	18	Show that the lines represented by $x^2 - 5xy + 6y^2 = 0$ are perpendicular or not.	K5	CO3
4	19	Differentiate with respect to x if $\frac{2\log x}{x}$.	K2	CO4
5	20	A company's marginal cost function is Mc $(x) = 3x^2 + 2x + 5$ where $x = units\ produced$. Find the total cost function if fixed cost is Rs.100.	K5	CO5

Z-Z-Z END

23CBA310N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch – **COMMERCE (BUSINESS ANALYTICS)**

NOSQL-MONGODB

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which of the following is an example of a document-based NoSQL database? a)MySQL b)MongoDB c)Pl/SQL d) Redis	K1	CO1
	2	MonogoDB stores data in which format? a)CSV b)XML c)BSON d)text	K2	CO1
2	3	In MongoDB, the operator $gt is used for____ a)Patten matching b)Greater than comparison c) Less than comparison d) Checking existence	K1	CO2
	4	What is a fundamental structural difference between XML and JSON? a) XML is used for data, JSON is used for documents. b) XML uses tags, JSON uses key-value pairs and arrays. c) JSON must be validated against a schema, XML does not. d) XML is a subset of JSON.	K2	CO2
3	5	Which MongoDB clause is used to limit the number of documents in the output? a) restrict() b) limit() c) reduce() d) slice()	K1	CO3
	6	Why is projection queries used in MongoDB? a) To delete documents b) To display only selected fields of documents c) To sort documents in order d) To group documents by a field	K2	CO3
4	7	Which tool is used for taking a backup of a MongoDB database? a) mongoexport b) mongodump c) mongoimport d) mongorestore	K1	CO4
	8	Why is replication used in MongoDB? a) To speed up queries b) To ensure data availability and fault tolerance c) To reduce document size d) To split large documents into smaller parts	K2	CO4
5	9	Which two main functions are required in MongoDB MapReduce? a) `map()` and `reduce()` b) `find()` and `aggregate()` c) `limit()` and `sort()` d) `insert()` and `delete()`	K1	CO5
	10	Which scenario best demonstrates the use of `$regex` in MongoDB? a) Finding all students with marks > 90 b) Finding all customer names that start with "R" c) Sorting employee records by salary d) Grouping orders by region	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Classify the differences between SQL and NoSQL with suitable examples.	K2	CO1
		(OR)		
	11.b.	Illustrate need for MonogoDB in Big data applications		
2	12.a.	Analyze the structural differences between XML and JSON.	K4	CO2
		(OR)		
	12.b.	Assume you are working with student performance data in MongoDB. How would you apply operators like `$gt`, `$lt`, and `$in` to discover meaningful academic trends?		
3	13.a.	Analyze how projection queries differ from field queries in MonogoDB.	K4	CO3
		(OR)		
	13.b.	Examine the effect of the `$unwind` operator in handling nested array fields in MongoDB. Support your analysis with a suitable example		
4	14.a.	Demonstrate how to create and drop an index in MongoDB with an example.	K3	CO4
		(OR)		
	14.b.	Apply MongoDB commands to create a new user with read and write roles. Show the syntax.		
5	15.a.	Examine how MapReduce differs from the aggregation framework in MongoDB.	K4	CO5
		(OR)		
	15.b.	Contrast the performance of MapReduce with simple query operations in handling large datasets		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Show the step-by-step process of importing and exporting data in MongoDB server configuration.	K2	CO1
2	17	Analyse the differences between parsing data from CSV, XLS, XML, and JSON formats. What advantages and limitations does each format present for data extraction?	K4	CO2
3	18	Examine how different aggregation operators (`$match`, `$project`, `$unwind`, `$group`) transform data at each stage of the aggregation pipeline, with a suitable example program	K4	CO3
4	19	Illustrate the creation of different types of indexes (single-field, compound, multikey, text) with example commands.	K3	CO4
5	20	Compare and Contrast the use of regular expressions and text indexes in MongoDB for text searching.	K4	CO5

Z-Z-Z END

23CBA313N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch – **COMMERCE (BUSINESS ANALYTICS)**

ECONOMETRICS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The least square estimators are (a) Unbiased (b) Biased (c) Efficient (d) Sufficient	K1	CO1
	2	Independent variable is also called as (a) explained variable (b) regressand variable (c) explanatory variable (d) dependent variable	K2	CO1
2	3	If generated value of tolerance is equals to 1, it is an indication of (a) Low Multicollinearity (b) Perfect Multicollinearity (c) No Multicollinearity (d) High Multicollinearity	K1	CO2
	4	Which test is used for finding out the pattern of multicollinearity (a) Chi-Square Test (b) t-test (c) F-test (d) Z-test	K2	CO2
3	5	Incorrect data transformation is also source of (a) Heteroskedasticity (b) Homoscedasticity (c) Multicollinearity (d) Biasness	K1	CO3
	6	In panel data T is greater than the subject N is called (a) Short (b) Long Panel (c) Balanced Panel (d) Unbalanced panel	K2	CO3
4	7	Input and Output analysis were 1st proposed by (a) prof Wassily Leonitef's (b) Prof Farrar Gulbar (c) Prof R A Fisher (d) Prof Simon D Poisson	K1	CO4
	8	The solution of input and output model is (a) $X=(I-A)F$ (b) $X=(I-A)^{-1}F$ (c) $X=(I-FA)^{-1}$ (d) $X=(A-I)^{-1}F$	K2	CO4
5	9	Durbin Watson test used as (a) Minimum sample size (b) Large sample size (c) As per the requirement (d) Based on population size	K1	CO5
	10	The autocorrelation disturbance tern $E(u_t)$ = (a) 0 (b) 1 (c) 2 (d) ∞	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the objectives and Scope of Econometric Model?	K2	CO1
		(OR)		
	11.b.	Explain economic forecasting and its types with suitable example.		
2	12.a.	Explain the term Multicollinearity with suitable example.	K3	CO2
		(OR)		
	12.b.	Elucidate the causes of Multicollinearity.		
3	13.a.	Explain the term heteroskedasticity and test for detecting heteroskedasticity.	K3	CO3
		(OR)		
	13.b.	Explain Univariate time series modelling.		
4	14.a.	Explain the limitations of I/O model.	K4	CO4
		(OR)		
	14.b.	Explain the closed input model.		
5	15.a.	Explain the features of ARIMA Model	K4	CO5
		(OR)		
	15.b.	Explain Box-Jenkins Model with suitable example.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Explain about Method of two variable linear regression model.	K4	CO1
2	17	Explain Multivariate econometric modelling with suitable example.	K4	CO2
3	18	Explain dummy variable and Uses of dummy variable in econometric model.	K4	CO3
4	19	$A=\begin{matrix} & S_1 & S_2 \\ \end{matrix}\begin{pmatrix} 0.2 & 0.4 \\ 0.1 & 0.5 \end{pmatrix}$ $F_1=60, F_2=40$ Analyze the output level of each other.	K4	CO4
5	20	What is auto correlation? And explain the methods of diagnosing auto correlation.	K4	CO5

Z-Z-Z END

23CBA416N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION DECEMBER 2025
(Fourth Semester)

Branch - **COMMERCE (BUSINESS ANALYTICS)**

R PROGRAMMING

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Q. no	Question	K Level	CO
1	R is primarily used for ---------- A) Web development B) Statistical computing and graphics C) Mobile application development D) Network configuration	K1	CO1
2	The function that combines vectors by columns is ---------- A) rbind() B) cbind() C) colbind() D) merge()	K2	CO1
3	The mode of an object in R represents ---------- A) The most frequent value B) The storage mode or data type C) The size of the object D) The class type of an object	K1	CO1
4	The function that gives the dimension of an array is --------- A) dim() B) size() C) shape() D) array.dim()	K2	CO1
5	Function is used to create a list in R is ---------- A) list() B) c() C) vector() D) data.frame()	K1	CO1
6	command to add a new column to a data frame is ---------- A) add() B) cbind() C) merge() D) append()	K2	CO1
7	In R, a block of grouped expressions returns ---------- A) Only the first value B) Only the last evaluated expression's value C) The average of all values D) Nothing	K1	CO1
8	The statement used for multiple condition checking in R is ---------- A) switch() B) elif() C) elseif D) ifelse()	K2	CO1
9	The plot() function in R can be used to create---------- A) Only scatterplots B) Scatterplots, lines, and type-specific graphs C) Only histograms D) Only barplots	K1	CO1
10	Mathematical expressions in plots can be added using---------- A) math() B) expression() C) text() D) mtext()	K1	CO1

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Q. No		Question	K Level	CO
11	a)	Explain the features and components of the R Environment	K2	CO2
		[OR]		
	b)	Illustrate character vectors in R		
12	a)	What is a ragged array? How can we handle uneven-length data using lists and tapply() in R?	K3	CO3
		[OR]		
	b)	Write an R script to demonstrate mixed vector and array arithmetic.		
13	a)	Discuss the advantages and limitations of data frames compared to matrices and lists.	K3	CO3
		[OR]		
	b)	Summarize the steps involved in importing and exploring datasets in R		
14	a)	List and describe different types of control statements available in R with examples	K4	CO4
		[OR]		
	b)	Justify the use of ifelse() over multiple if...else statements in handling vectorized conditions.		
15	a)	Define high-level and low-level plotting functions in R. Give one example of each.	K4	CO4
		[OR]		
	b)	Describe the role of mathematical annotation in R plots		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Q. no	Question	K Level	CO
16	Explain how to execute R commands and divert output to files.	K3	CO3
17	What are factors in R? Explain how ordered and unordered factors are created and used in statistical modeling.	K4	CO4
18	Write a detailed note on list indexing in R.	K4	CO4
19	Describe the difference between for, while, and repeat loops in R. Explain with an example where each type of loop is preferable.	K5	CO5
20	How can you display multivariate data effectively in R? Name one function and explain briefly.	K5	CO5

Z-Z-Z END