**PSG COLLEGE OF ARTS & SCIENCE**
(AUTONOMOUS)

**BCom DEGREE EXAMINATION DECEMBER 2025**
(Fifth Semester)

Branch – **COMMERCE (BUSINESS ANALYTICS)**

**APPLIED BUSINESS STATISTICS-III**

Time: Three Hours Maximum: 75 Marks

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

| Question No. | Question | K Level | CO |
|---|---|---|---|
| 1 | In regression analysis, the variable that is being predicted is called the<br>a) Independent variable b) Dependent variable<br>c) Explanatory variable d) Constant | K1 | CO1 |
| 2 | In the simple linear regression equation y=a+bx what does the parameter 'a' represent?<br>a) The slope of the line b) The intercept of the y-axis<br>c) The independent variable d) The dependent variable | K2 | CO1 |
| 3 | What is the process of estimating an intermediate value within a range of known data points called?<br>a) Extrapolation b) Interpolation<br>c) Curve fitting d) Regression | K1 | CO2 |
| 4 | Which method among the following is an algebraic method for interpolation?<br>a) Binomial expansion method b) Graphical method<br>c) Data analysis method d) Polynomial regression | K2 | CO1 |
| 5 | The fundamental theory that provides the basis for making inferences in Statistical Quality Control (SQC) is<br>a) Set Theory b) Probability Theory<br>c) Statistical Inference Theory d) Control Chart Theory | K1 | CO1 |
| 6 | A c-chart is used to monitor<br>a) The number of defectives in a sample<br>b) The number of defects in a sample<br>c) The average value of a product characteristic<br>d) The range of a product characteristic | K2 | CO2 |
| 7 | Which of the following is NOT a fundamental principle of TQM?<br>a) Customer focus b) Employee involvement<br>c) Top management approval d) Process approach | K1 | CO1 |
| 8 | What is the primary goal of the ISO 9000 series standards?<br>a) To certify an organization's financial health<br>b) To provide customers with confidence in a supplier's Quality Management System<br>c) To set prices for products and services<br>d) To dictate specific production methods | K2 | CO1 |
| 9 | Reliability is defined as<br>a) The probability that a system will fail under specified conditions for a given period of time.<br>b) The probability that a system will perform its intended function without failure under specified conditions for a given period of time<br>c) The probability of a system being available for use at any random time<br>d) The ease with which a system can be repaired or maintained | K1 | CO1 |
| 10 | For a system with a constant failure rate, the time-to-failure follows which distribution?<br>a) Normal distribution b) Weibull distribution<br>c) Lognormal distribution d) Exponential distribution | K2 | CO2 |

**Cont...**

## SECTION - B (35 Marks)

Answer **ALL** questions

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

| Question No. | Question | K Level | CO |
|---|---|---|---|
| 11.a. | A company has found a linear relationship between the number of cold calls made by sales representatives (X) and the number of sales closed (Y). The regression equation is Y = 0.5X + 2. If a sales representative makes 10 cold calls, what is the predicted number of sales closed? Also, describe the trend indicated by this equation. | K2 | CO2 |
| | (OR) | | |
| 11.b. | You are given the following data:<br>X Y<br>Arithmetic mean 36 85<br>Standard deviation 11 8<br>r 0.66<br>Find the two regression equations. | | |
| 12.a. | Find the figure of sales for the year 2020 from the data given below. Use binomial expansion method.<br>Year : 2018 2019 2021 2022<br>Sales(000): 100 107 157 212 | K3 | CO3 |
| | (OR) | | |
| 12.b. | By using Lagrange's formula, determine the percentage of criminals under 35 years of age:<br>Age — Percentage of Criminals<br>Under 25 years — 52.0<br>Under 30 years — 67.3<br>Under 40 years — 84.1<br>Under 50 years — 94.4 | | |
| 13.a. | Explain the types of control charts? | K2 | CO3 |
| | (OR) | | |
| 13.b. | A drilling machine bores holes with a mean diameter of 0.5230 cm. and a S.D of 0.0032 cm. Calculate the 2-sigma and 3-sigma upper and lower control limits for means of sample 4, and prepare a control chart. | | |
| 14.a. | Explain the evaluation of TQM | K3 | CO3 |
| | (OR) | | |
| 14.b. | What is ISO 9000 and state its significance? | | |
| 15.a. | 50 components are tested for two weeks. 20 of them fail in this time, with an average failure time of 1.2weeks. What is the mean time till failure? | K3 | CO3 |
| | (OR) | | |
| 15.b. | Given one unit in series with four units in parallel (reliabilities: 0.91, 0.96, 0.89, 0.98) and another in series with reliability 0.85, find total reliability. | | |

## SECTION -C (30 Marks)

Answer **ANY THREE** questions

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

| Question No. | Question | K Level | CO |
|---|---|---|---|
| 16 | The following table shows the ages (X) and the blood pressure (Y) of 8 persons.<br>X : 52 63 45 36 72 65 47 25<br>Y : 62 53 51 25 79 43 60 33<br>Obtain the regression equation of Y on X and find the expected blood pressure of a person who is 49 years old. | K3 | CO1 |
| 17 | Find premium payable at the age of 26 by using Newton's forward difference formula:<br>Age ( in years) : 20 25 30 35 40<br>Premium (Rs.) : 230 260 300 350 420 | K3 | CO2 |
| 18 | In a glass factory the task of quality control was done with the help of means ($\bar{X}$) and standard deviation ($\sigma$) charts. 18 samples of 10 items each were chosen and $\sum X$ and $\sum \sigma$ were found to be 595.8 and 8.28 respectively. Determine $3\sigma$ limits for mean and standard deviation charts. You may use the following control factors for your calculation:<br>N $A_1$ $B_2$ $B_4$<br>10 1.03 0.28 1.72 | K4 | CO3 |
| 19 | Explain the TQM framework and its tools and techniques. | K4 | CO2 |
| 20 | A manufacturer tests a batch of 500 new electronic components for a total of 150,000 hours of operating time. During this period, 30 failures occur. Assuming the components have a single-parameter exponential failure distribution:<br>1.Calculate the failure rate ($\lambda$), the Mean Time To Failure (MTTF), and the reliability of the components after 2,000 hours of operation.<br>2. Determine the hazard rate function, and the cumulative hazard rate function.<br>3. Calculate the probability that a component that has already survived for 1,000 hours will survive for another 1,500 hours. | K4 | CO3 |

Z-Z-Z END