

**TILAK MAHARASHTRA VIDYAPEETH, PUNE****MASTER OF BUSINESS ADMINISTRATION****(M.B.A. – SPORTS MANAGEMENT)****EXAMINATION : DECEMBER -2025****SEMESTER - I****Sub: Business Statistics (MBA25-S104)****Date: 27/12/2025****Total marks: 60****Time: 10.00 am To 12.30 pm****Q. 1. Answer in Detail.****(30)**

1. In a tennis championship, the serve speeds of professional players follow a normal distribution with mean  $\mu=170$  km/h and standard deviation  $\sigma=10$  km/h. Answer the following, showing all working:

1. What is the probability that a randomly selected serve is faster than 185 km/h?
2. What percentage of serves are expected to fall between 160 km/h and 180 km/h?

If there are 500 serves recorded during the tournament, how many of them are expected to be faster than 185 km/h? (Round to nearest whole number.)

2. A sports scientist wants to estimate the average reaction time (in seconds) of athletes during sprint starts. A random sample of 50 athletes gives a mean reaction time of 0.28 seconds with a standard deviation of 0.05 seconds. Assuming the data is approximately normally distributed,
- a) Find the 95% confidence interval for the true mean reaction time of all athletes.
  - b) Interpret the meaning of this confidence interval in the context of the problem.
3. Two basketball players, Player A and Player B, each played 6 games. Their scores (total points scored in each game) are as follows:
- Player A: 18, 22, 26, 30, 34, 38
  - Player B: 10, 20, 30, 40, 50, 60
- a) Calculate the mean and standard deviation of the scores for both players.
  - b) Determine which player is more consistent in performance and explain why.

**Q. 2. Write Short Notes: (Any Two)****(10)**

1. During a football season, a team scores an average of 2.5 goals per match. Find the following:
1. The probability that the team scores exactly 3 goals in a match.
  2. The probability that the team scores at most 1 goal in a match.
  3. The probability that the team scores more than 4 goals in a match.
2. A sports statistician is studying the average number of runs scored per over in T20 cricket matches. From a preliminary study, the sample mean is 9.2 runs per over, and the sample standard deviation is 1.8 runs. The statistician wants to construct a 95% confidence interval with a margin of error (E) not exceeding 0.5 runs. Find the required sample size (n) needed to achieve this level of accuracy.

3. In your own words, explain the concept of Sampling.
  - Describe different sampling methods and illustrate each with an example.
  - Explain what is meant by sampling bias and sampling error.
  - Discuss the factors that influence the determination of sample size.
  - Define a population parameter (true value).
  - Finally, explain what a confidence interval is and state the formula used to calculate it.
4. Define Bayesian probability and explain how it differs from classical probability. Describe the meaning of prior probability, evidence, and posterior probability, and illustrate your answer with a clear, simple example.

**Q. 3. Answer in Short:**

**(10)**

1. What does the mean of a dataset show?
2. Define standard deviation in simple words.
3. What does a p-value tell us in a hypothesis test?
4. Name any two measures of central tendency.
5. A coin is tossed 4 times. What is the probability of getting exactly 2 heads?

**Q. 4. Case Study**

**(10)**

A sports researcher is studying whether **training methods** affect **athletes' performance**.

- Three groups of athletes are trained using **different techniques** (Group A, B, and C).
- The researcher collects performance scores after 8 weeks.

- a) Formulate the **null and alternative hypotheses** for this study.
- b) Explain which statistical test — **Z-test, t-test, Chi-square test, or ANOVA** — would be most appropriate here and **justify your choice**.
- c) Suppose the **p-value = 0.03** and the **significance level  $\alpha = 0.05$** . Interpret this result in terms of hypothesis testing.
- d) Briefly explain how **ANOVA** differs from using multiple t-tests in this context.