

**2025 / FYUG / ODD / SEM /
STADSM-301 / 302T / 045**

FYUG Odd Semester Exam., 2025

STATISTICS

(5th Semester)

Course No. : STADSM-301/302T

(Statistical Inference and Applied Statistics)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

UNIT—I

• Answer any *two* of the following questions :

2×2=4

- (a) Define parameter and statistic.
- (b) What are null hypothesis and alternative hypothesis?
- (c) Define level of significance and significant value.

2. Answer any one of the following questions : 10

(a) (i) Define simple hypothesis and composite hypothesis. 2

(ii) Prove that sample mean is an unbiased estimate of population mean. 3

(iii) Explain clearly the steps which are to be followed in testing a hypothesis. 3

(iv) Write a note on one-tailed and two-tailed test. 2

(b) (i) Define type-II error and consumer's risk. 2

(ii) Define critical region and test statistic. 3

(iii) Write the steps to test the difference of means of a large sample. 2

(iv) A random sample of 150 tins of oil give an average weight of 4.925 kg with a standard deviation of 0.2 kg. Based on these values, can the hypothesis be accepted that the net weight of each tin is 5 kg at 5% level of significance? 3

UNIT—II

3. Answer any two of the following questions : 2×2=4

(a) Define Student's t -statistic.

(b) Write the conditions of validity of χ^2 -distribution.

(c) State the properties of Snedecor's F -distribution.

4. Answer any one of the following questions : 10

(a) (i) Define χ^2 -statistic. State the applications of χ^2 -distribution. 1+2=3

(ii) Obtain the moment-generating function of χ^2 -distribution. 3

(iii) Write the relationship between t - and F -distribution. 4

(b) (i) Define Snedecor's F -statistic. 2

(ii) For the 2×2 contingency table

$$\begin{array}{c|c} a & b \\ \hline c & d \end{array}$$

prove that χ^2 -test of independence gives—

$$\chi^2 = \frac{N(ad - bc)^2}{(a + c)(b + d)(a + b)(c + d)},$$

$$N = a + b + c + d \quad 5$$

(4)

- (iii) A random sample of 10 observations gives the following result :

$$\Sigma x_i = 400, \Sigma (x_i - \bar{x})^2 = 160$$

Test if the sample has come from a population with mean $\mu = 35$. [Given that for 10 d.f. at 5% level of significance $t = 2.23$ and for 9 d.f. at 5% level of significance $t = 2.26$]

3

UNIT—III

5. Answer any two of the following questions :

2×2=4

- (a) Define index number with example.
- (b) State two criteria to select the period.
- (c) Write Laspeyres' and Paasche's price index numbers.

6. Answer any one of the following questions :

10

- (a) (i) Define Fisher's price index number. Explain why Fisher's index number is called an ideal index number. 1+4=5
- (ii) Define chain base index number. 2
- (iii) Explain why index number is called economic barometer. 3

(5)

- (b) (i) Define consumer's price index number. Write the steps in the construction of consumer's price index number. State the uses of consumer's price index number. 1+3+2=6

- (ii) Prove that Fisher's index number lies between Laspeyre's and Paasche's index numbers. 4

UNIT—IV

7. Answer any two of the following questions :

2×2=4

- (a) Define time series with example.
- (b) Explain secular trend briefly.
- (c) Write the applications of time series.

8. Answer any one of the following questions : 10

- (a) (i) Write short notes on seasonal variation and cyclical variation of time series. 5
- (ii) Explain the mathematical models of time series. 3
- (iii) Write a short note on irregular variation. 2

(6)

- (b) (i) Explain the moving average method of measuring trend. Mention its merits and demerits. $3+3=6$
- (ii) Explain semiaverage method of measuring trend. Draw a trend line using semiaverage method from the following data : $2\frac{1}{2}+1\frac{1}{2}=4$

Year	2005	2006	2007	2008	2009
Production (in MT)	38	40	30	39	42

Year	2010	2011	2012	2013
Production (in MT)	47	45	49	52

UNIT—V

9. Answer any two of the following questions :

$2 \times 2 = 4$

- (a) Write the merits of measuring trend using least squares method.
- (b) Write the merits and demerits of the method of simple averages of measuring seasonal variation.
- (c) Define link relative method.

10. Answer any one of the following questions : 10

- (a) (i) Write a note on the method of measuring trend using least squares method. 5

(7)

- (ii) Fit a straight-line trend equation to the following data : 5

Year	2007	2008	2009	2010
Production (in MT)	101	107	113	121

Year	2011	2012	2013
Production (in MT)	136	148	152

- (b) (i) Explain the method of measuring seasonal variation using 'ratio to moving average' method. 5
- (ii) Write a note on measuring seasonal variation using 'ratio to trend' method. 5
