 PG/IIS/COM/202.1 & 202.2/25

M.Com. 2nd Semester Examination, 2025

COMMERCE

(*Advanced Statistics*)

PAPER – COM-202

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

COM-202.1

1. Answer any *two* questions from the following : 5×2

(*a*) Explain the concept of probability distribution. How is probability distribution used in decision making processes ? $3 + 2$

(*b*) Prove that Poisson distribution is a limiting case of Binomial distribution under certain conditions.

(*c*) Explain the method of drawing a sample considering multistage random sampling technique. State the situation where multistage random sampling is used. 4 + 1

2. Answer any *one* question from the following : 10 × 1

(*a*) (*i*) The administrator of a large airport is interested to investigate the number of aircraft departure delays that are attributable to inadequate control facilities. A random sample of 10 aircrafts take off is to be thoroughly investigated. If the true proportion of such delays in all departures is 0.04, what is the probability that 4 of the sample departures are delayed because of control inadequacies ? Also find the value of the skewness

and kurtosis of the distribution and comment on the nature of the distribution. (Given $e^{-10} = 0.00005$, $e^{-4} = 0.0183$, $e^{-0.4} = 0.6703$, $e^{-0.04} = 0.9608$)

(*ii*) In 10 independent throws of a defective die, the probability that an even number will appear 5 times is twice the probability that an even number will appear 4 times. Find the probability that an even number will not appear at all in 10 independent throws of the die. 6 + 4

(*b*) (*i*) Time taken by a construction company to construct a flyover is a normal variate with mean 400 labour days and standard deviation of 100 labour days. If the company promises to construct the flyover in 450 days or less and agrees to pay a penalty of Rs. 10,000 for each labour day spent in excess of 450, what is the probability that :

(*ii*) A company wants to know whether marital status affects the number of hours spent on the internet per week. The study on 360 people reveals the following.

	<10 Hours	10-30 Hours	>30 Hours	Total
Single	40	80	60	180
Married	60	100	20	180
Total	100	180	80	360

Is there a significant association between marital status and internet usage ?
[Given : The table value of Chi-square at 5% level of significance and for 2 d.f. is 5.991] 4 + 6

(*b*) (*i*) What is ANOVA ? State its assumptions.

(*ii*) Three types of fertilizers viz. A, B, and C are tested to see their effect

on crop yield (in kg). The data collected from total 15 plots, divided into 5 plots for each fertilizer are given below.

Fertilizer-A	Fertilizer-B	Fertilizer-C
20	25	23
22	27	22
21	26	21
18	21	25
16	18	17

Conduct a one-way ANOVA to determine if there is a significant difference in mean yield across the fertilizers at the 5% significance level.

3 + 7

[Internal Assessment — 10 Marks]