No. of Printed Pages : 6 **MSTL–011(Set-II)**

M. SC. (APPLIED STATISTICS)
[MSCAST]
Term-End Practical Examination
June, 2026

MSTL–011(Set-II) : STATISTICAL COMPUTING USING R-I

Time : $2\frac{1}{2}$ Hours *Maximum Marks : 50*

***Note** : (i) Attempt any **two** questions.*

(ii) Solve the questions using R software and create a script file.

(iii) Symbols have their usual meanings.

(iv) Mention necessary formulae, steps, hypotheses, interpretations etc.

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1. (a) Create a function to compute the following expression and display your results for M = 1 to 10.

$$\sum_{n=1}^{m} (-1)^{n+1} \left(\frac{2}{3}\right)^n$$

(b) Evaluate $\int_0^1 \int_0^2 (x^3 + 2y)\, dx\, dy$ and

$$\frac{d}{dx}(e^{-x}x^4)$$

at $x = 2$.

(c) The built-in dataset 'datasets :: women' consists of 15 rows corresponding to two variables 'height' and 'weight'. Considering both the variables as two separate populations, do the following tasks for each population :

(i) Draw a simple random sample of size 5 without replacement.

(ii) Enumerate all possible samples of size 2 and verify $E(s^2) = \sigma^2$.

5+10+10=25

2. (a) If a random variable X follows geometric distribution with probability 0.4, then find x, such that :

$P(X \leq x) = 0.50$ and $P(X > x) = 0.20$

(b) A manufacturer of electronic items produces fans in lots of 1000 fans each. A single sampling plan is used to test for bad outgoing quality. Considering incoming quality as 0.01, compute the probability of acceptance of a lot and average outgoing quality with n = 10 and c = 2.

(c) Consider the following monthly sales data (in lakhs) of a hardware company. Use the method of simple moving averages to compute the seasonal indices.

Year / Month	1749	1750	1751	1752
January	58.0	73.3	70.0	55.0
February	62.6	75.9	53.5	60.0
March	70.0	89.2	85.3	81.0
April	55.7	88.3	86.4	99.3
May	85.0	90.0	90.7	99.7
June	93.5	98.0	99.7	100.0
July	94.8	85.4	76.3	78.4

August	66.3	99.0	69.8	59.3
September	75.9	91.2	59.5	47.1
October	75.5	65.7	59.2	46.6
November	58.6	63.3	68.5	47.6
December	50.2	65.4	54.0	40.0

Also, compute and plot the deseasonalised data along with the original time series. 5+5+15=25

3. (a) The following data gives the number of defective mobile phones in 16 independent samples of varying sizes from a production process.

Sample Number	**Sample Size**	**Number of Defectives**
1	1590	210
2	1970	240
3	1760	225
4	1770	224
5	2000	212
6	1950	256
7	1920	215

8	1620	162
9	1520	162
10	1520	97
11	1850	195
12	1840	103
13	1500	98
14	1900	224
15	1600	270
16	1590	260

Compute the control limits and construct the control chart for proportion of defectives using two different approaches. Interpret the results.

(b) In an experiment study four kind of feeds were compared. The researchers applied each treatment to five chicks. Each of the twenty chicks was randomly assigned to one of the four feeds. At the

end of the one year, the gain in weights (in kgs) of the chicks were recorded.

Feed	**Gain in Weight**				
A	20	30	28	25	30
B	10	12	20	25	28
C	28	27	21	20	13
D	20	16	15	14	6

Do the following tasks by using a suitable R function.

(i) Recognise the design.

(ii) Create a 'txt' file for the analysis purpose.

(iii) Test the claim that at least one of the four feeds has a different effect on chicks. 16+9=25

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